ELECTRONICALLY CONTROLLED AUTOMATIC TRANSMISSION (ECT)

OPERATION CHECK

1. INSPECT SHIFT LOCK OPERATION

(a) Move the shift lever to the P position.

(b) When operating the shift lever, check that the shift lever cannot be moved to any position other than the P position.

(c) Check that the shift lever can be moved out of the P position when the ignition switch is turned to the ON position and the brake pedal is depressed.

2. CHECK KEY INTERLOCK OPERATION

(a) Turn the ignition switch to the ON position.

(b) While depressing the brake pedal, check that the shift lever can be moved out of the P position.

(c) Check that the ignition key cannot be turned to the LOCK position.

(d) Move the shift lever to the P position and turn the ignition key to the LOCK position, and check that the ignition key can be removed.

3. CHECK TIME LAG

NOTICE:

- **Be sure to check for time lag after checking and adjusting the engine.**
- **Be sure to perform this check when the fluid is at its normal driving temperature (70-90°C).**
- **Perform this check when the air conditioning is turned OFF.**

(a) Apply the parking brake and use chocks.

(b) Start the engine.

(c) While depressing the brake pedal, shift from the N position to the D or R position with the engine idling, and measure the time until the shock can be felt.

Standard:

N → D position: 1.0 second or less

N → R position: 1.0 second or less

NOTICE:

- **Take several measurements and use the average.**
- **Allow an interval of 1 minute between measurements..**

4. CHECK STALL SPEED

NOTICE:

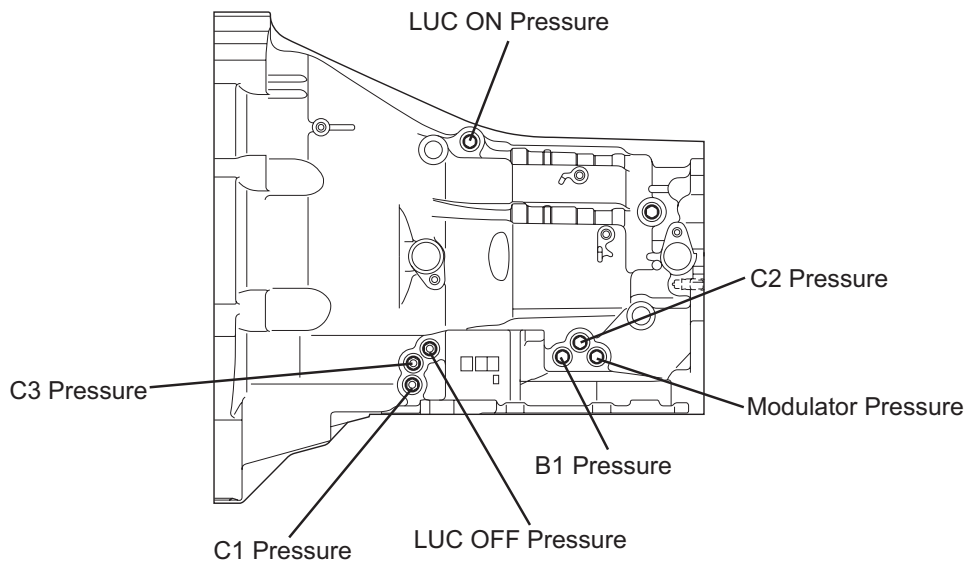
- **Be sure to perform this check after checking and adjusting the engine.**
- **Be sure to perform this check when the fluid is at its normal driving temperature (70-90°C).**
- **Perform this check when the air conditioning is turned OFF.**
- **Do not perform this check continuously for more than 5 seconds.**
- **Perform this inspection where the μ (friction coefficient) is high, such as on the asphalt, to prevent the wheels from spinning.**

(a) Apply the parking brake and use chocks.

(b) Using the DS-II, following the prompts on the screen, select ECU DATA LIST and ENGINE SPEED.
(c) Start the engine.
(d) Fully depress the accelerator pedal with the left foot, shift to the D position, then quickly read the maximum engine speed when fully depressing the accelerator pedal with the right foot.
Standard:
2200 to 2700 r/min

5. CHECK FLUID PRESSURE

(a) Pressure gauge installation procedure



NOTICE:
- **Clean the measurement gauges and hoses using a solvent before and after the measurements.**
- **Use a new gasket for the SST and measurement gauges.**
- **The test plugs are not reusable.**

(1) Remove the test plug, then install an automatic transmission oil pressure gauge and adapter.
SST 09325-87201
NOTICE:
Ensure that the gauge and adapter do not interference with the front propeller shaft assembly.
(2) Start the engine and warm-up the transmission (between 70 and 90°C), and check the volume and leaks of the fluid.
(3) After the test is completed, install a new test plug.
Torque: 9.8 N*m (100 kgf*cm)

(b) C2 pressure test
(1) Apply the parking brake and use chocks.
(2) Start the engine.

AT

(3) Firmly depress the brake pedal with the left foot and shift to the D position. Operate the accelerator pedal with the right foot and measure the fluid pressure.

Standard:

930 to 1130 kPa [9.4 to 11.4 kgf/cm^2]

(c) C1 pressure test

(1) Apply the parking brake and use chocks.

(2) Start the engine.

(3) Firmly depress the brake pedal with the left foot and shift to the R position. Operate the accelerator pedal with the right foot and measure the fluid pressure.

Standard:

1520 to 2110 kPa [15.5 to 21.5 kgf/cm^2]

(d) B1 pressure test

(1) Lift up the vehicle.

(2) Start the engine.

(3) Shift to the D position, gradually depress the accelerator pedal to shift to the 2nd gear, then measure the fluid pressure at engine speed of 2,000 r/min.

Standard:

930 to 1130 kPa [9.4 to 11.4 kgf/cm^2]

(e) C3 pressure test

(1) Lift up the vehicle.

(2) Start the engine.

(3) Shift to the D position, gradually depress the accelerator pedal to shift to the 3rd gear, then measure the fluid pressure when releasing the accelerator pedal.

Standard:

440 to 640 kPa [4.5 to 6.5 kgf/cm^2]

(f) LUC OFF pressure test

(1) Lift up the vehicle.

(2) Start the engine.

(3) Shift to the D position and measure the fluid pressure.(Fluid pressure when the lock-up is OFF)

Standard:

590 to 750 kPa [6.0 to 7.6 kgf/cm^2]

(4) Gradually depress the accelerator pedal to shift to the 4th gear, and keep accelerating. Measure the fluid pressure when the lock-up occurs.(Fluid pressure when the lock-up is ON)

Standard:

20 kPa [0.2 kgf/cm^2 or less]

6. SHIFT TABLE

NOTICE:

- **Be sure to perform this check after checking and adjusting the engine.**
- **Be sure to perform this check when the fluid is at its normal driving temperature (50-80°C).**
- **Perform this test with no electrical load, air conditioning OFF, and the brake not applied.**

Standard:

AT

Throttle Valve Opening Angle	Position	Shift Change	Vehicle Speed (km/h)	
			2WD	4WD
100%	D Position	1st → 2nd	41-56	38-53
		2nd → 3rd	86-101	78-93
		3rd → 4th	141-156	130-145
		4th → 3rd	133-148	124-139
		3rd → 2nd	77-92	71-86
		2nd → 1st	30-45	27-42
0%	D Position	4th → 3rd	23-38	20-35
		3rd → 2nd	10-25	9-24
		2nd → 1st	10-25	9-24
Inhibit	D Position	4th → 3rd	133-148	124-139
		3rd → 2nd	82-97	75-90
		2nd → 1st	37-52	34-49

Lock-up

Throttle Valve Opening Angle	Gear Position	Vehicle Speed (km/h)	
		2WD	4WD
5-100%	3rd ON	110-125	100-115
	3rd OFF	99-114	89-104
5-20%	4th ON	62-77	62-77
	4th OFF	58-73	58-73

7. ROAD TEST

CAUTION:

Ensure the safety of the road before performing this test.

NOTICE:

- **Be sure to perform this test after checking and adjusting the engine.**
- **Be sure to perform this test when the fluid is at its normal driving temperature (70-80°C).**
- **Perform this test when the air conditioning and cruise control are turned OFF.**

HINT:

AT

ROAD TEST CHART

Inspection Item	Inspection and Check Procedures
D position shift function	Check that the transmission shifts from/to 1st ←→ 2nd ←→ 3rd ←→ 4th under normal driving conditions (city driving).
Shift shock level when driving in D position	During normal driving, check the shock level at each up-shift.
Kick-down function	• Perform the kick-down operation at each gear, and check that the transmission downshifts normally. • Check the shock level at kick-down.
Engine brake operation	• While driving in the 3 position and 3rd gear (at a vehicle speed of approximately 40 to 50 km/h), shift into the 2 position and check the 2nd gear engine brake operation. • While driving in the 2 position and 2nd gear (at a vehicle speed of approximately 20 to 30 km/h), shift into the L position and check the operation of the 1st gear engine brake.
Shift point when the accelerator pedal is fully depressed	Fully depress the accelerator pedal in the D position to start off, then check that the 1st to 2nd upshift speed meets the shift point.
Lockup function	Lightly depress the accelerator pedal when driving at a constant speed within the lock-up speed range on a level road. Check that the engine speed does not change abruptly.
P position operation	Park the vehicle on a slope with a grade of approximately 5 degree or more, shift to the P position, and release the parking brake. Check that the vehicle does not move.

Inspection Item	Inspection and Check Procedures
Abnormal noise, vibration	Check for abnormal noise and vibration when driving and shifting.
Hill control function	• When driving on an uphill, check that the up-shift to 4th gear is prohibited. • When applying the brake while driving downhill in 4th gear with the accelerator pedal fully depressed, check that the transmission downshifts to the 3rd gear.
Fluid leaks	Check each unit for fluid leaks after the road test.

8. MANUAL ROAD TEST

(a) Disconnect the transmission wire connector.

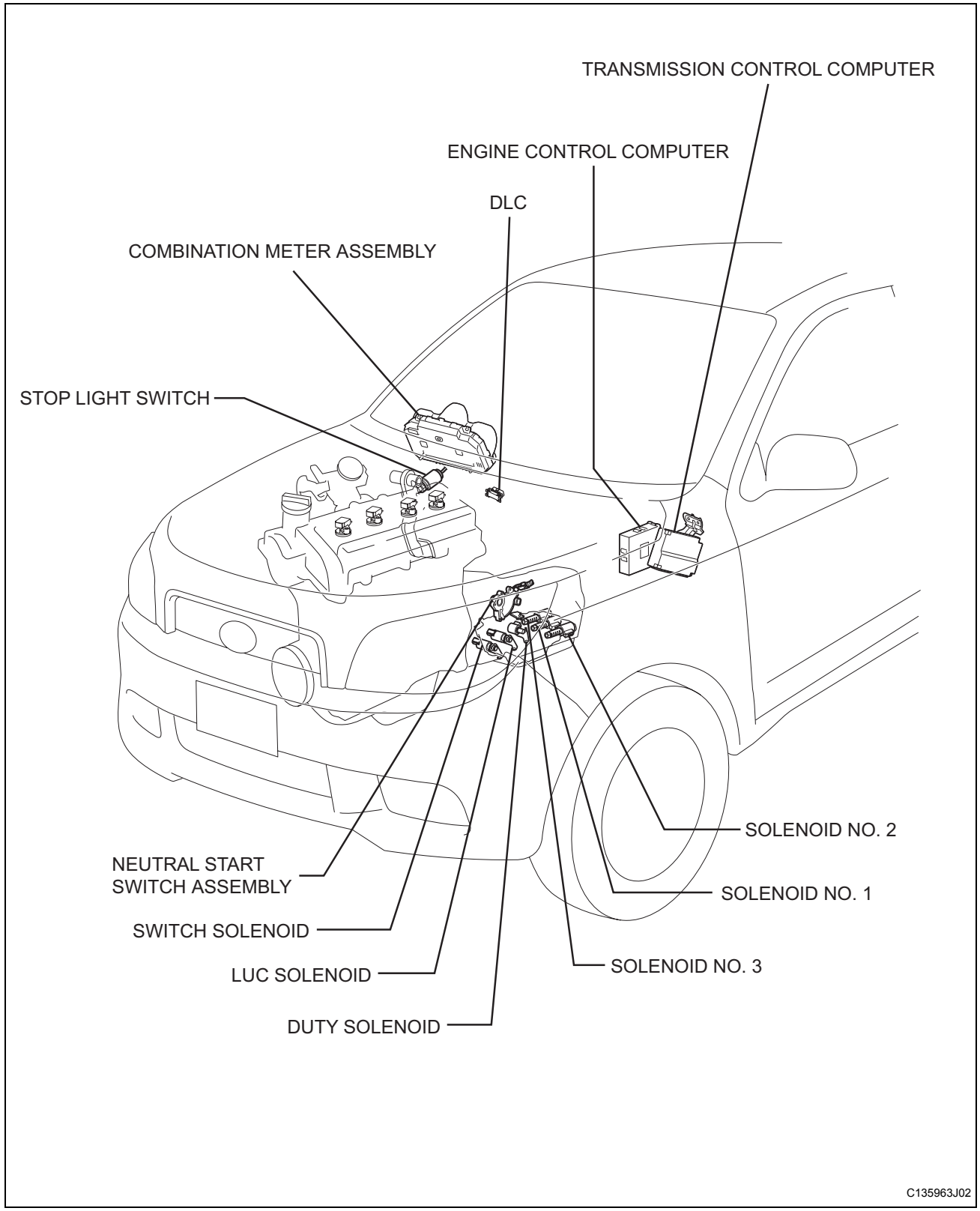
(b) Check that the gear shifts to the appropriate position while driving.

Standard:

Shift Lever Position	Position
D position	3rd

(c) Clear DTCs after the manual road test.

LOCATION


TRANSMISSION CONTROL COMPUTER
ENGINE CONTROL COMPUTER
DLC
COMBINATION METER ASSEMBLY
STOP LIGHT SWITCH
SOLENOID NO. 2
NEUTRAL START
SWITCH ASSEMBLY
SOLENOID NO. 1
SWITCH SOLENOID
SOLENOID NO. 3
LUC SOLENOID
DUTY SOLENOID
C135963J02

AT

DIAGNOSTIC TROUBLE CODE CHART

DTC No.	Diagnostic Item	Lamp	Code Memory	See Page
P0705/55	No input from the neutral start switch	×	×	AT-24
P0705/56	Multiple input from the neutral start switch	○	○	AT-24
P0710/38	Open or short in the fluid temperature sensor circuit	○	○	AT-27
P0711/38	Fluid temperature sensor performance problem	○	○	AT-27
P0715/37	No input for turbine speed	○	○	AT-29
P0720/42	No input for output speed	○	○	AT-31
P0725/86	No input for engine speed	○	○	AT-33
P0753/61	Open or short in the solenoid No. 1 circuit	○	○	AT-35
P0758/62	Open or short in the solenoid No. 2 circuit	○	○	AT-35
P0763/63	Open or short in the solenoid No. 3 circuit	○	○	AT-35
P0768/64	Open or short in the duty solenoid circuit	○	○	AT-39
P0773/65	Open or short in the LUC solenoid circuit	○	○	AT-41
P1703/72	Lock-up speed does not match	○	○	AT-44
P1706/31	Engine torque error	○	×	AT-45
P1711/41	Throttle sensor signal error	○	×	AT-46
P1730/21	Battery system power source error	○	○	AT-47
P1731/22	Sensor system power source error	○	○	AT-50
P1780/66	Open or short in the switch solenoid circuit	○	○	AT-41
U0100/82	EFI communication receiving error	○	○	AT-53
U0101/85	EFI communication sending error	○	○	AT-53

AT

PROBLEM SYMPTOMS TABLE

Symptom	Suspected Area	See Page
Does not upshift (any of the gears from 1st to 3rd gear do not upshift)	1. Solenoid (No. 1)	-
	2. Solenoid (No. 3)	-
	3. Transmission control computer assembly	AT-17
Does not upshift (3rd to 4th)	1. Solenoid (No. 1)	-
	2. Solenoid (No. 2)	-
	3. Solenoid (No. 3)	-
	4. Switch solenoid	-
	5. Transmission control computer assembly	AT-17

Symptom	Suspected Area	See Page
Does not downshift (4th to 3rd)	1. Solenoid (No. 1)	-
	2. Solenoid (No. 2)	-
	3. Transmission control computer assembly	AT-17
Does not upshift (any of the gears from 1st to 3rd gear do not downshift)	1. Solenoid (No. 1)	-
	2. Solenoid (No. 3)	-
	3. Switch solenoid	-
	4. Transmission control computer assembly	AT-17
Lock-up does not occur or does not turn off	1. Duty solenoid	-
	2. LUC solenoid	-
	3. Turbine speed sensor system	-
	4. Engine coolant temperature sensor	-
	5. Fluid temperature sensor	-
	6. Transmission control computer assembly	AT-17
Shift point too high or too low	1. Throttle sensor system	-
	2. Output speed sensor system	-
	3. Neutral start switch assembly system	-
	4. Transmission control computer assembly	AT-17
Up-shift to 4th gear when transmission is cold	1. Fluid temperature sensor system	AT-27
	2. Transmission control computer assembly	AT-17
Harsh engagement (N → D)	1. Solenoid (No. 2)	-
	2. Transmission control computer assembly	AT-17
Harsh engagement (when shifting to any gear)	1. Throttle sensor system	-
	2. Solenoid (No. 1)	-
	3. Solenoid (No. 2)	-
	4. Solenoid (No. 3)	-
	4. Turbine speed sensor system	-
	5. Transmission control computer assembly	AT-17
Harsh engagement (Lock-up)	1. Duty solenoid	-
	2. LUC solenoid	-
	3. Engine speed	-
	4. Turbine speed sensor system	-
	5. Transmission control computer assembly	AT-17
Poor acceleration	1. Solenoid (No. 3)	-
	2. Switch solenoid	-
	3. Transmission control computer assembly	AT-17
The engine stalls when the vehicle is stopped or when the shift lever is moved to the D or R position after the engine is started.	1. Switch solenoid	-
	2. Transmission control computer assembly	AT-17

AT

DESCRIPTION

1. DIAGNOSIS FUNCTION

(a) The O/D light blinks when a malfunction occurs in the AT system.

NOTICE:

If the system returns to normal, the O/D light does not come on.

(b) The result of diagnosis regarding the time the malfunction occurred is stored in the transmission control computer.

NOTICE:

Do not remove the ECUB fuse and battery terminals until the inspection is completed as the memory of the computer will be erased.

2. FAIL-SAFE FUNCTION

(a) If an open or short circuit occurs in any of the solenoid valve circuits, the transmission control computer turns the other solenoid valves ON or OFF.In addition, if all of the solenoid valves are disabled, only the mechanical hydraulic circuit is available, enabling manual shifting. (If an open or short circuit occurs, the transmission control computer stops sending current to the failed solenoid valve.

HOW TO PROCEED WITH TROUBLE-SHOOTING

1	VEHICLE BROUGHT TO WORKSHOP

2	CONDUCT CUSTOMER PROBLEM ANALYSIS AND CHECK SYMPTOMS

HINT:

See page AT-12.

3	CHECK COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM FOR CONTROL

(a) Using the DS-II, check for DTCs by selecting DIAGNOSIS → VEHICLE DIAGNOSIS/CAN BUS DIAGNOSIS → DIAGNOSIS FUNCTION/COMMUNICATION ERROR DTC CHECK.

HINT:

See page CA-9 for the CAN COMMUNICATION section.

DTC DETECTED (GO TO CAN COMMUNICATION SECTION)

NO DTC (GO TO STEP 5)

4	CHECK FOR DTCS

HINT:

See page AT-13.

(a) CHECK DTC AND FREEZE FRAME DATA

(1) Record the DTCs and the freeze frame data.

(b) CLEAR DTCs AND FREEZE FRAME DATA

(c) RE-CHECK FOR DTCS

(1) Based on the DTCs and freeze frame data recorded, reproduce the symptoms that caused the problem and re-check for the DTCs.

HINT:

- If DTCs are output, see Diagnostic Trouble Code Chart (See page AT-7).
- See page IN-30 for MALFUNCTION REPRODUCTION.

DTC DETECTED (GO TO STEP 8)

DTC NOT DETECTED, SYMPTOMS CANNOT BE CONFIRMED AND REPRODUCED (GO TO MALFUNCTION REPRODUCTION)

DTC NOT DETECTED, BUT SYMPTOMS CAN BE CONFIRMED AND REPRODUCED (GO TO STEP 6)

5	PROBLEM SYMPTOMS TABLE

HINT:

See page AT-7.

RELATED TO PROBLEM SYMPTOM (GO TO STEP 8)

NOT RELATED TO PROBLEM SYMPTOM (GO TO STEP 7)

6	PERFORM TROUBLESHOOTING BASED ON PROBLEM SYMPTOM

(a) DS-II ECU DATA LIST (See page AT-20).

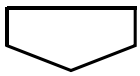
(b) DS-II ACTIVE TEST (See page AT-20).

(c) MANUAL ROAD TEST (See AT-5).

(d) ECU TERMINALS (See page AT-17).

7	ADJUST, REPAIR OR REPLACE

8	CONFIRMATION TEST



END

CUSTOMER PROBLEM ANALYSIS CHECK

Customer's Name	First Registration Year Year Month
Model	VIN
Date Vehicle Brought In	Odometer Reading km

Weather	Clear Cloudy Rainy Snowy Others
Temperature	Approximately
Road Conditions	

Date Problem First Occurred	Month _____ Day _____ (Engine: ___Cold ___Warm)
Frequency Problem Occurs	Continuous Intermittent (____times a day)

Symptoms	___Vehicle unable to move (__All shift positions ___A specific shift position [___Position])
	__Does not shift up (___1st → 2nd ____2nd → 3rd ___ 3rd → 4th)
	__Does not shift down (____4th → 3rd ____ 3rd → 2nd ____ 2nd → 1st)
	__Poor lock up
	__Poor gear change
	__Large gear change shock (N → D or R ___ Lock up ___During gear change(s)
	__Poor acceleration (Slipping etc.)
	__Abnormal sound or vibration
	__Others ( )

MIL Condition	___On ( ) ___Off

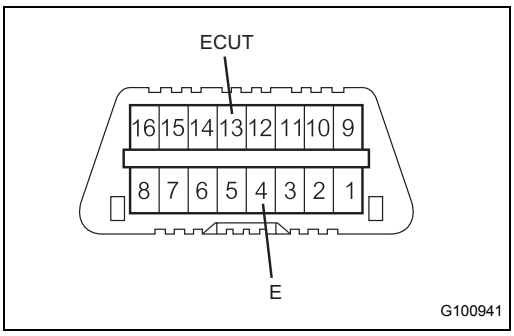
DTC Inspection	First time ___ Normal Code	Malfunction Code
	Second time ___ Normal Code	Malfunction Code
The first time a malfunction code is output, freeze frame data is also output.		
Freeze Frame Data		

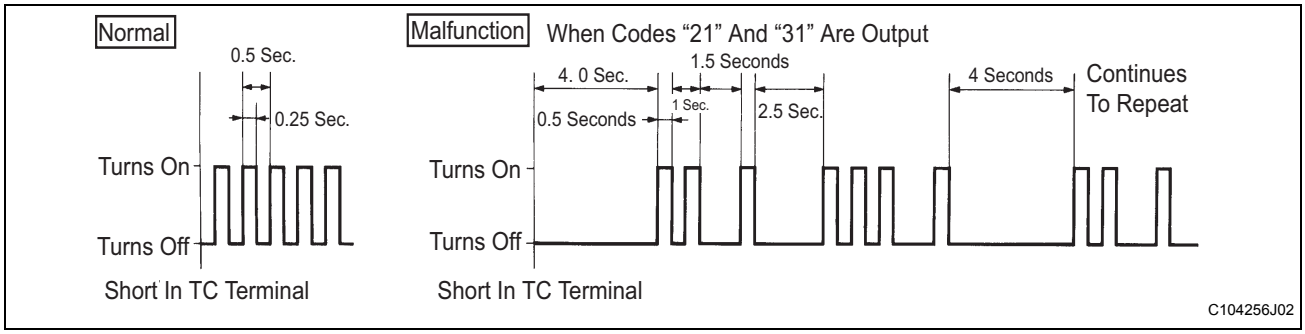
G020628

AT

CHECK / CLEAR DTCs

1. **CHECK DTCS (using DS-II)**
   (a) Using the DS-II, follow the prompts and display the DIAGNOSIS - A/T screen, then select DTC FREEZE DATA.
   (b) Check for DTCs.
   HINT:
   If the freeze frame data is recorded, "I" will be displayed on the left side and the color of that column will be changed.
2. **DS-II FREEZE FRAME DATA**
   (a) Using the DS-II, following the prompts on the screen, select CHECK DTC and select the DTCs that have the records of the freeze frame data (indicated by a "I" mark).
   HINT:
   - Check the consistency between the problem symptoms from inquiry and the diagnostic trouble code chart.
   - After completing repairs, conduct the confirmation test based upon the driving conditions confirmed above.
3. **CLEAR DTCS (using DS-II)**
   (a) Using the DS-II, follow the prompts and display the DIAGNOSIS - A/T screen, then select DTC FREEZE DATA.
   (b) Select CLEAR from the screen to clear the data.
   NOTICE:
   DTCs and freeze frame data will be cleared at the same time.
4. **CHECK DTCs (using check engine warning light)**
   (a) Short terminals 13 (ECUT) and 4 (E) of the DLC.
   NOTICE:
   Be sure to short the specified terminals correctly, or a malfunction may occur.
   (b) Turn the ignition switch to the ON position.
   (c) Read the DTCs (count the number of times that the check engine warning light blinks).





NOTICE:
When a letter is used such as [C1] of the DS-II code, it indicates a hexadecimal value. These hexadecimal values use two characters. When they are displayed, they blink 12 times, then once.(at even intervals)

Hexadecimal Conversion Table

Hexadecimal	Number of Blinks
A	10

Hexadecimal	Number of Blinks
B	11
C	12
D	13
E	14
F	15

HINT:

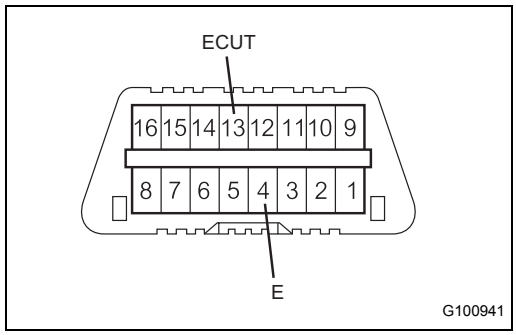
- If the system is normal, the warning light will blink repeatedly at an interval of 0.25 seconds on and 0.25 off.
- When only one code is present, the same code will be output again at 4-second intervals.
- When 2 or more DTCs are present, the different codes will be output in series at 2.5-second intervals.When all the codes have been output, the series will return to the beginning and, after a 4.5 second pause, the codes will be output again.
- When 2 or more codes are output, the code with the lower number is indicated first.

(d) Turn the ignition switch off.

(e) Open the circuit between terminals 13 (ECUT) and 4 (E) of the DLC.

5. DELETE DTCs FROM MEMORY (by removing a fuse)

(a) After repairing the trouble area, disconnect the ECUB fuse in the engine compartment for more than 60 seconds, then reconnect it.



(b) Short terminals 13 (ECUT) and 4 (E) of the DLC.

NOTICE:

Be sure to short the specified terminals correctly, or a malfunction may occur.

(c) Turn the ignition switch to the ON position.

(d) Check that the normal code is output.

NOTICE:

If any trouble codes are output, perform trouleshooting again in accordance with the output codes.

(e) Turn the ignition switch off.

(f) Open the circuit between terminals 13 (ECUT) and 4 (E) of the DLC.

FREEZE FRAME DATA / DTC DETAILED INFORMATION

1. DS-II FREEZE DATA

(a) Using the DS-II, following the prompts on the screen, select CHECK DTC and select the DTCs that have the records of the freeze frame data (indicated by a "I" mark).

HINT:

- Check the consistency between the problem symptoms from inquiry and the diagnostic trouble code chart.

- After completing repairs, conduct the confirmation test based upon the driving conditions confirmed above.

FREEZE FRAME DATA LIST

Item	Abbreviation	Item	Abbreviation
Engine Speed	ESPD	LUC Solenoid	LUC
Turbine Speed	RTBN	Switch Solenoid	SW
Output Speed	ROPT	Battery Voltage	VOLT
Vehicle Speed	SPD	O/D OFF Switch	O/D
Shift Position	SHFT	Throttle Opening Angle	TANG
Solenoid No. 1 Current	SOL1	Oil Temperature	OTMP
Solenoid No. 2 Current	SOL2	Gear Position	GEAR
Solenoid No. 3 Current	SOL3	Gear Ratio	RATO
Duty Solenoid	DUTY	-	-

OPERATION SUPPORT

1. INITIALIZATION OF DS-II AT LEANED VALUE

NOTICE:

- **When replacing any of the transmission assembly, valve body assembly, transmission wire, and transmission control computer, perform the AT LEARNED VALUE INITIALIZATION.**
- **Wait at least 1 minute after connecting the battery terminal before performing the initialization of the automatic transmission learned values.**

HINT:

Learned values will not be initialized (erased) by simply disconnecting the negative (-) terminal of the battery.

(a) After confirming that the shift position is in the P position, connect the DS-II to the DLC and turn the ignition switch ON and the DS-II power ON.

NOTICE:

Do not start the engine.

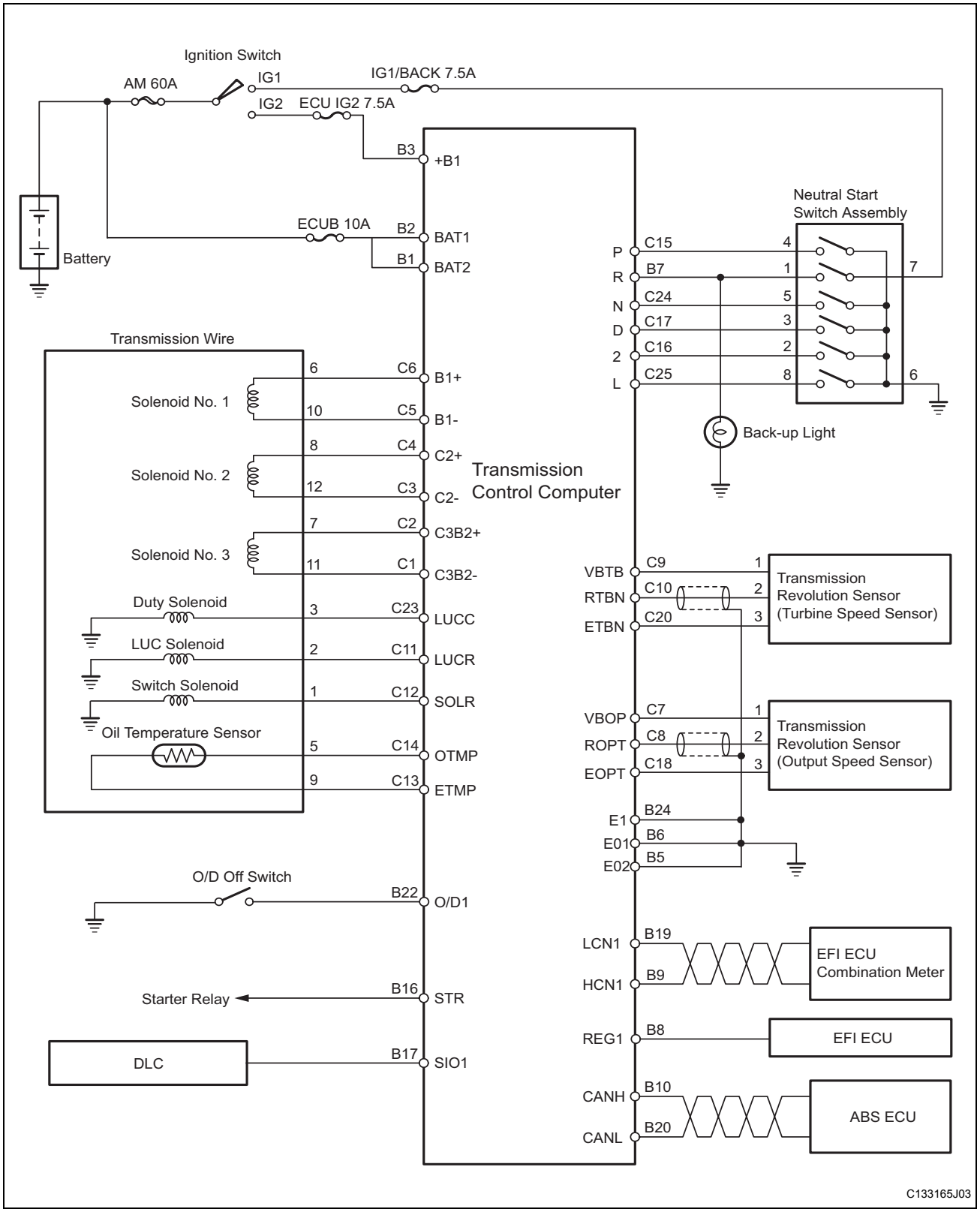
(b) Conduct AT learned value initialization

(1) To initialize learned values, follow the DS-II screen display, select MAIN MENU [OPERATION SUPPORT] → OPERATION SUPPORT CLASSIFICATION [A/T] → [AT LEARNED VALUE INITIALIZATION] and run [AT LEARNED VALUE INITIALIZATION].

HINT:

Initialization will complete in about 1 minute.

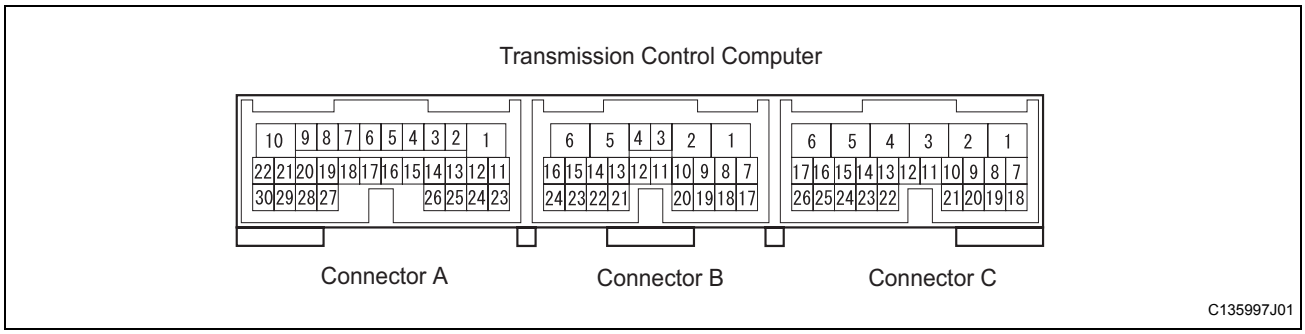
CIRCUIT DIAGRAM



AT

ECU TERMINALS

1. TRANSMISSION CONTROL COMPUTER ASSEMBLY



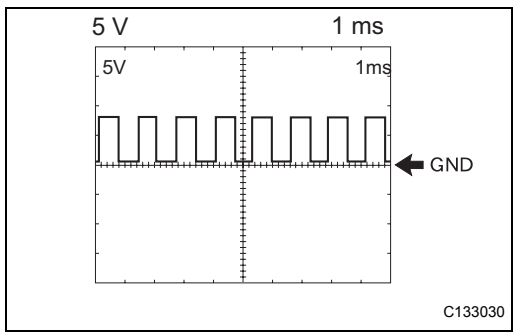
HINT:
Using SST , check the voltage, pulse, and conductivity between the terminals of the connector.
SST 09842-97215

TERMINAL LAYOUT

Terminal Symbol (Terminal No.)	Input / Output	Item	Measurement Condition	Standard
RTBN ⟷ E1 [C10 ⟷ B24]	Input	Waveform	Engine idle speed	Waveform 1
ROPT ⟷ E1 [C8 ⟷ B24]	Input	Waveform	When driving at 20 km/h	Waveform 2
VBTB ⟷ E1 [C9 ⟷ B24]	Output	Voltage	Engine is stopped, ignition switch ON	10 to 14 V
VBOP ⟷ E1 [C7 ⟷ B24]	Output	Voltage	Engine is stopped, ignition switch ON	10 to 14 V
REG1 ⟷ E1 [B8 ⟷ B24]	Output	Waveform	Engine idle speed	Waveform 3
P ⟷ E1 [C15 ⟷ B24]	Input	Voltage	Shift lever in P position	7.5 to 14 V
P ⟷ E1 [C15 ⟷ B24]	Input	Voltage	Shift lever in any position other than P	0 to 1.5 V
R ⟷ E1 [B7 ⟷ B24]	Input	Voltage	Shift lever in R position	7.5 to 14 V
R ⟷ E1 [B7 ⟷ B24]	Input	Voltage	Shift lever in any position other than R	0 to 1.5 V
N ⟷ E1 [C24 ⟷ B24]	Input	Voltage	Shift lever in N position	7.5 to 14 V
N ⟷ E1 [C24 ⟷ B24]	Input	Voltage	Shift lever in any position other than N	0 to 1.5 V
D ⟷ E1 [C17 ⟷ B24]	Input	Voltage	Shift lever in D position	7.5 to 14 V
D ⟷ E1 [C17 ⟷ B24]	Input	Voltage	Shift lever in any position other than D	0 to 1.5 V
2 ⟷ E1 [C16 ⟷ B24]	Input	Waveform	Shift lever in 2nd position	7.5 to 14 V
2 ⟷ E1 [C16 ⟷ B24]	Input	Waveform	Shift lever in any position other than 2nd position	0 to 1.5 V
L ⟷ E1 [C25 ⟷ B24]	Input	Voltage	Shift lever in L position	7.5 to 14 V
L ⟷ E1 [C25 ⟷ B24]	Input	Voltage	Shift lever in any position other than L	0 to 1.5 V

Terminal Symbol (Terminal No.)	Input / Output	Item	Measurement Condition	Standard
OTMP ⟷ ETMP [C14 ⟷ C13]	Input	Voltage	Transmission fluid temperature 20 C	3.4 V
OTMP ⟷ ETMP [C14 ⟷ C13]	Input	Voltage	Transmission fluid temperature 80 C	1.1 V
B1+ ⟷ B1- [C6 ⟷ C5]	Output	Waveform	Without electricity	0 to 1.5 V
B1+ ⟷ B1- [C6 ⟷ C5]	Output	Waveform	With electricity	Waveform 4
C2+ ⟷ C2- [C4 ⟷ C3]	Output	Waveform	Without electricity	0 to 1.5 V
C2+ ⟷ C2- [C4 ⟷ C3]	Output	Waveform	With electricity	Waveform 5
C3B2+ ⟷ C3B2- [C2 ⟷ C1]	Output	Waveform	Without electricity	0 to 1.5 V
C3B2+ ⟷ C3B2- [C2 ⟷ C1]	Output	Waveform	With electricity	Waveform 6
LUCC ⟷ E01 C23 ⟷ B6]	Output	Waveform	Lock-up is OFF	0 to 1.5 V
LUCC ⟷ E01 C23 ⟷ B6]	Output	Waveform	When slip lock-up occurs	Waveform 7
LUCR ⟷ E01 C11 ⟷ B6]	Output	Voltage	Without electricity	0 to 1.5 V
LUCR ⟷ E01 C11 ⟷ B6]	Output	Voltage	With electricity	10 to 14 V
SOLR ⟷ E01 C12 ⟷ B6]	Output	Voltage	Without electricity	0 to 1.5 V
SOLR ⟷ E01 C12 ⟷ B6]	Output	Voltage	With electricity	10 to 14 V
+B1 ⟷ E01 B3 ⟷ B6]	Output	Voltage	Engine is stopped, ignition switch ON	10 to 14 V
BAT1 ⟷ E01 B2 ⟷ B6]	Output	Voltage	Always	10 to 14 V
BAT2 ⟷ E01 B1 ⟷ B6]	Output	Voltage	Always	10 to 14 V
E1 ⟷ Body Ground [B24 ⟷ Body Ground]	-	Continuity	Always	Continuity
E01 ⟷ Body Ground [B6 ⟷ Body Ground]	-	Continuity	Always	Continuity
E02 ⟷ Body Ground [B5 ⟷ Body Ground]	-	Continuity	Always	Continuity

AT

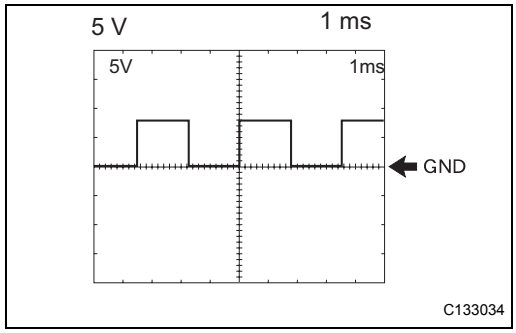


(a) Waveform 1 (turbine speed sensor)

Item	Condition
Tester Connection	RTBN ⟷ E1
Tool Setting	5 V/DIV 1 ms/DIV
Measurement Condition	Engine idle speed

HINT:

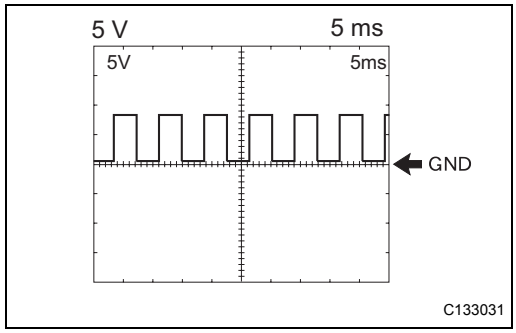
As turbine speed increases, the cycle becomes shorter.



(b) Waveform 2 (output speed sensor)

Item	Condition
Tester Connection	ROPT ⟷ E1
Tool Setting	5 V/DIV 1 ms/DIV
Measurement Condition	Driving at approx. 20 km/h

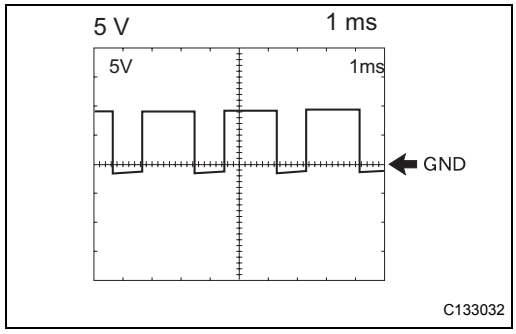
HINT:
As output speed (vehicle speed) increases, the cycle becomes shorter.



(c) Waveform 3 (engine speed signal)

Item	Condition
Tester Connection	REG1 ⟷ E1
Tool Setting	5 V/DIV 5 ms/DIV
Measurement Condition	Engine idle speed

HINT:
As engine speed increases, the cycle becomes shorter.

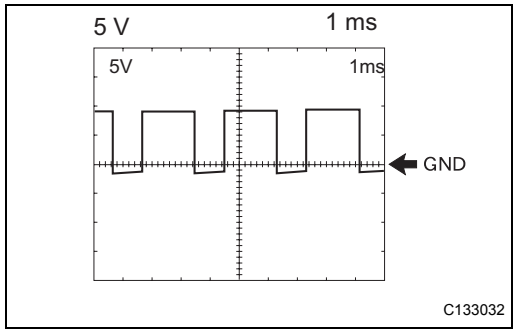


(d) Waveform 4 (solenoid No. 1)

Item	Condition
Tester Connection	B1+ ⟷ B1-
Tool Setting	5 V/DIV 1 ms/DIV
Measurement Condition	With electricity

HINT:
During the shift transition, the duty ratio decreases.

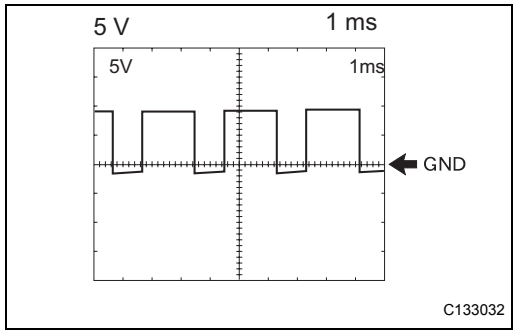
AT



(e) Waveform 5 (solenoid No. 2)

Item	Condition
Tester Connection	C2+ ⟷ C2-
Tool Setting	5 V/DIV 1 ms/DIV
Measurement Condition	With electricity

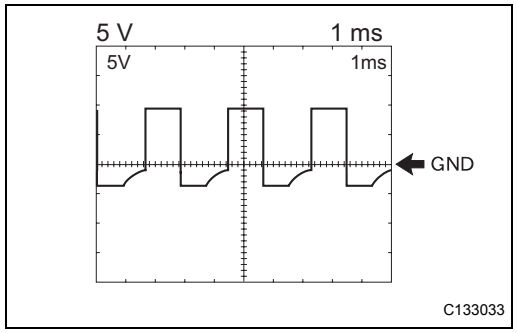
HINT:
During the shift transition, the duty ratio decreases.



(f) Waveform 6 (solenoid No. 3)

Item	Condition
Tester Connection	C3B2+ ⟷ C3B2-
Tool Setting	5 V/DIV 1 ms/DIV
Measurement Condition	With electricity

HINT:
During the shift transition and line pressure regulation, the duty ratio decreases.



(g) Waveform 7 (duty solenoid)

Item	Condition
Tester Connection	LUCC ⟷ E01-
Tool Setting	5 V/DIV 5 ms/DIV
Measurement Condition	When slip lock-up occurs

HINT:
During the direct lock-up, the duty ratio becomes 100 %.

ECU DATA LIST / ACTIVE TEST

1. DS-II - DATA LIST

NOTICE:

In the event of a problem with intricate symptoms such as surge or rough idling, collect sample data from another vehicle of the same model operating under identical conditions in order to reach an overall judgment by comparing all the items in the data list.

(a) Using the DS-II, following the prompts on the screen, select ECU DATA LIST and read the data.

[ANALYSIS MENU:A/T → ECU DATA LIST]

Item [Symbol]	Item Description	Inspection Condition	Reference Value	Problem Area
Engine Speed [RENG]	Indicates the engine speed	Engine is stopped, ignition switch ON	0 r/min	REG1 signal
Engine Speed [RENG]	Indicates the engine speed	Constant engine speed	No significant fluctuation	REG1 signal
Turbine Speed [RTBN]	Indicates the transmission input speed Display: r/min	Vehicle stopped with shift lever in P or N position (when engine idling)	Almost the same as engine idle speed	RTBN signal
Turbine Speed [RTBN]	Indicates the transmission input speed Display: r/min	Vehicle stopped with shift lever in D position	0 r/min	RTBN signal
Turbine Speed [RTBN]	Indicates the transmission input speed Display: r/min	When driving at a constant speed	No significant fluctuation	RTBN signal
Output Speed [ROPT]	Indicates the transmission output shaft speed Display: r/min	When the vehicle is stopped	0 km/h	ROPT signal
Output Speed [ROPT]	Indicates the transmission output shaft speed Display: r/min	When driving at a constant speed	No significant fluctuation	ROPT signal
Vehicle Speed [SPD]	Indicates the vehicle speed calculated from the output speed by the A/T ECU Display range: 0 to 255 km/h	When the vehicle is stopped	0 km/h	CAN signal
Vehicle Speed [SPD]	Indicates the vehicle speed calculated from the output speed by the A/T ECU Display range: 0 to 255 km/h	When driving at a constant speed	No significant fluctuation	CAN signal

AT

Item [Symbol]	Item Description	Inspection Condition	Reference Value	Problem Area
Solenoid No. 1 Current [SOL1]	Indicates the electrical current to the B1 solenoid (No. 1) Display range: 0 to 1,200 mA	B1 solenoid (No. 1) ON → OFF	1,000 → 0 mA*1	B1 solenoid (No. 1)
Solenoid No. 2 Current [SOL2]	Indicates the electrical current to the C2 solenoid (No. 2) Display range: 0 to 1,200 mA	C2 solenoid (No. 2) ON → OFF	1,000 → 0 mA*1	C2 solenoid (No. 2)
Solenoid No. 3 Current [SOL3]	Indicates the electrical current to the C3 solenoid (No. 3) Display range: 0 to 1,200 mA	C3 solenoid (No. 3) ON → OFF	1,000 → 0 mA*1	C3 solenoid (No. 3)
Duty Solenoid [DUTY]	Indicates the ON duty ratio of the LUC solenoid Display range: 0 to 100 %	LUC solenoid ON → OFF	100→0%	Duty solenoid
LUC Solenoid [LUC]	Indicates the operating status (ON/OFF) of the LUC solenoid	LUC solenoid ON → OFF	ON → OFF	Switch solenoid
Switch Solenoid [SW]	Indicates the operating status (ON/OFF) of the switch solenoid	Switch solenoid ON → OFF	ON → OFF	LUC solenoid
Battery Voltage [VOLT]	Indicates the battery voltage Display range: 0 to 25.5 V	Engine idling	9 to 14 V	BAT1 voltage BAT2 voltage
O/D OFF Switch [O/D]	Indicates the operating status (ON/OFF) of the O/D OFF switch	O/D OFF switch ON → OFF	ON → OFF	O/D1 voltage
Brake Switch [BRKS]	Indicates the operating status (ON/OFF) of the brake switch	Stop light switch ON → OFF	ON → OFF	ABS ECU signal
Throttle Opening Angle [TANG]	Indicates the throttle opening angle Display range: 0 to 100 %	Accelerator pedal fully released → fully depressed	Continuously changes	EFI ECU signal
Oil Temperature [OTMP]	Indicates the ATF temperature Display range: -50 to 205 °C	When cold (IG ON)	Equal to outside air temperature	OTMP voltage
Oil Temperature [OTMP]	Indicates the ATF temperature Display range: -50 to 205 °C	Sensor circuit is open (IG ON)	-50°C	OTMP voltage
Oil Temperature [OTMP]	Indicates the ATF temperature Display range: -50 to 205 °C	Sensor circuit is shorted (IG ON)	205°C	OTMP voltage
Gear Position [GEAR]	Indicates the current gear position	When driving	Shift to each gear position	Neutral start switch signal
Gear Ratio [RATO]	Indicates the gear ratio Display range: 0 to 3.999	-	-	-
Torque Converter Slip Volume [SLIP]	Indicates the torque converter slip volume calculated from the engine speed - turbine speed (During IG ON →OFF) Display range: -5,120 to 5,080 r/min	-	-	-

AT

HINT:

*1: The value may exceed 1,000 mA due to the current feedback.

2. **DS-II-ACTIVE TEST**

(a) Using the DS-II, following the prompts on the screen, select ACTIVE TEST to perform the active test.

[DIAGNOSIS MENU SCREEN: A/T → ACTIVE TEST]

Item	Test Contents	Condition
Solenoid No.1	Turns the B1 solenoid (No. 1) ON (electrical current 1 A)/OFF (electrical current 0 A) and cancels drive signals from the DS-II.	IG ON P position Vehicle speed 0 km/h Throttle opening angle 2 % or less
Solenoid No. 2	Turns the C2 solenoid (No. 2) ON (electrical current 1 A)/OFF (electrical current 0 A) and cancels drive signals from the DS-II.	
Solenoid No. 3	Turns the C3 and B2 solenoids (No. 3) ON (electricity current 1 A)/OFF (electricity current 0 A) and cancels drive signals from the DS-II.	
Duty Solenoid	Turns the LUC control (duty) solenoid ON (duty ratio 100%)/OFF (duty ratio 0%) and cancels drive signals from the DS-II.	
LUC Solenoid	Turns the LUC shift solenoid ON/OFF (without electricity) and cancels drive signals from the DS-II.	
Switch Solenoid	Turns the switch solenoid ON/OFF (without electricity) and cancels drive signals from the DS-II.	

FAIL-SAFE CHART

If any of the codes below are stored in the ECU, the ECU enters fail-safe mode.

AT

DTC SAE/ECTS	Fail-safe Operation	Fail-safe Mode Cancel Condition
P0705/55 P0705/56	Performs the normal shifting control with the shift lever in the D position	Canceled after normal conditions are restored
P0710/38 P0711/38	Shifts to the 3rd gear when the error is detected, then shifts between the 1st and 3rd gears according to the vehicle speed and throttle opening angle	Canceled when the shift lever is moved to the P or N position with the vehicle speed at 0 km/h after normal conditions are restored
P0715/37	Shifts to the 3rd gear when the error is detected, then shifts between the 1st and 3rd gears according to the vehicle speed and throttle opening angle	Canceled when the shift lever is moved to the P or N position with the vehicle speed at 0 km/h after normal conditions are restored
P0720/42	• If the sensor system has some errors, the gear position that was selected at the time of the detection of the error is retained, and the transmission will be fixed at the 1st gear after the vehicle is stopped. • If the transmission assembly body has some errors, the transmission will be fixed at the 1st gear.	• For sensor system errors, fail-safe operation will be canceled when the shift lever lever is moved to the P or N position with the vehicle speed at 0 km/h after normal conditions are restored. • For transmission assembly body errors, the fail-safe operation will be canceled when the ignition switch is turned off after normal conditions are restored.
P0725/86	Shifts to the 3rd gear when the error is detected, then shifts between the 1st and 3rd gears according to the vehicle speed and throttle opening angle	Canceled when the shift lever is moved to the P or N position with the vehicle speed at 0 km/h after normal conditions are restored
P0753/61 P0758/62 P0763/63 P0768/64 P0773/65 P1780/66	• Prohibits sending current to the solenoid that is determined to be defective • If a short circuit occurs, normal solenoids are used to shift between the 1st and 3rd gears.However, if solenoid No. 3 and the switch solenoid are shorted, the transmission will be fixed at 3rd gear. • If an open circuit occurs or more than 1 solenoid has faults, the transmission will be fixed at 3rd gear.	Canceled when the ignition switch is turned off after normal conditions are restored

DTC SAE/ECTS	Fail-safe Operation	Fail-safe Mode Cancel Condition
P1706/31	• Controls the engine torque at a constant value • Shifts to the 3rd gear when the error is detected, then shifts between the 1st and 3rd gears according to the vehicle speed and throttle opening angle	Canceled when the shift lever is moved to the P or N position with the vehicle speed at 0 km/h after normal conditions are restored
P1711/41	• Controls the throttle opening angle at a constant value • Shifts to the 3rd gear when the error is detected, then shifts between the 1st and 3rd gears according to the vehicle speed and throttle opening angle	Canceled when the shift lever is moved to the P or N position with the vehicle speed at 0 km/h after normal conditions are restored
P1730/21	Shifts to the 3rd gear after the error is detected	Canceled when the ignition switch is turned off after normal conditions are restored
P1731/22	Shifts to the 3rd gear after the error is detected	Canceled when the ignition switch is turned off after normal conditions are restored
U0100/82	• Controls the throttle opening angle and engine torque at a constant value • Shifts to the 3rd gear when the error is detected, then shifts between the 1st and 3rd gears according to the vehicle speed and throttle opening angle	Canceled when the shift lever is moved to the P or N position with the vehicle speed at 0 km/h after normal conditions are restored
U0101/85	• Controls the throttle opening angle and engine torque at a constant value • Shifts to the 3rd gear when the error is detected, then shifts between the 1st and 3rd gears according to the vehicle speed and throttle opening angle	Canceled when the shift lever is moved to the P or N position with the vehicle speed at 0 km/h after normal conditions are restored

DTC	P0705/55	No Input from the Neutral Start Switch

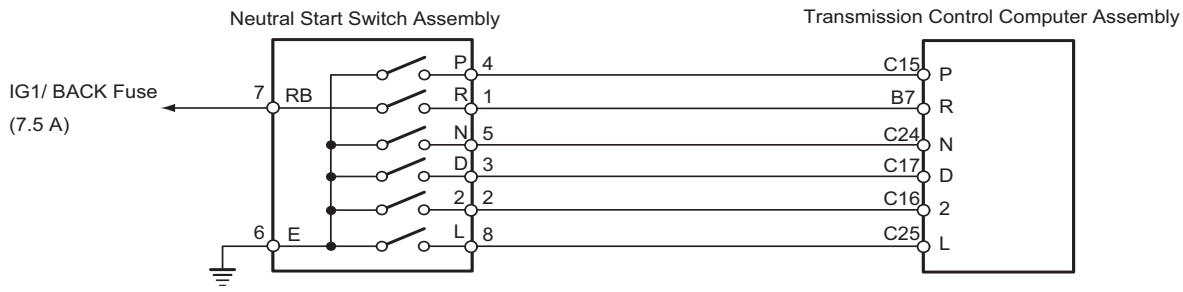
DTC	P0705/56	Multiple Input from the Neutral Start Switch

DESCRIPTION

The shift positions are detected based on the signals input from the neutral start switch assembly to the transmission control computer assembly.

DTC No.	Detection Item	Trouble Area
P0705/55	No shift position signal is input.	• Wire harness and connector (transmission control computer assembly - neutral start switch assembly) • Neutral start switch assembly • Transmission control computer assembly
P0705/56	Multiple shift position signals are input.	• Wire harness and connector (transmission control computer assembly - neutral start switch assembly) • Neutral start switch assembly • Transmission control computer assembly

CIRCUIT DESCRIPTION



C134807J01

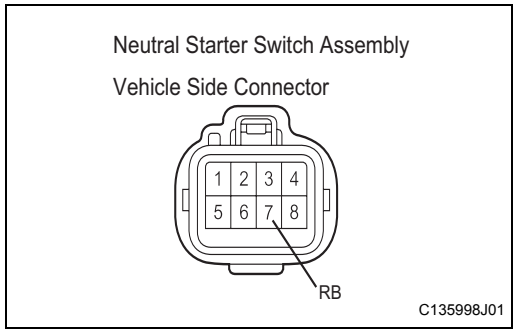
AT

INSPECTION PROCEDURE

1	INSPECT WIRE HARNESS AND CONNECTOR (POWER SOURCE SYSTEM)

HINT:

See page IN-38 for the inspection procedure and precautions for the wire harness and connector.



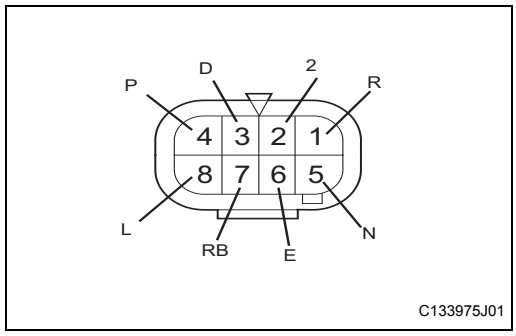
(a) Disconnect the neutral start switch assembly connector.
(b) Turn the ignition switch to the ON position, and using the tester, measure the terminal voltage of the wire harness side connector.
Standard:

Terminal No. (Terminal Symbols)	Voltage [V]
7 (RB) ⟷ Body Ground	9-14

NG → **INSPECT POWER SOURCE SYSTEM**

OK

2 INSPECT NEUTRAL START SWITCH ASSEMBLY



(a) Using the tester, check the continuity between the terminals of the neutral start switch assembly.
Standard:

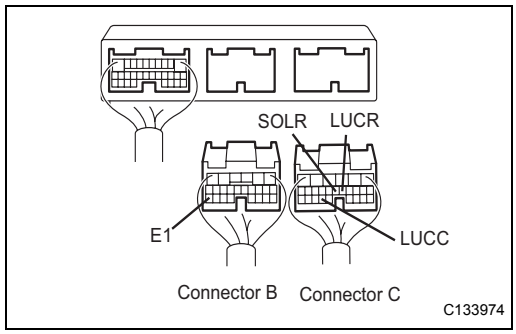
Shift Position	Terminal No. (Terminal Name)	Continuity
P position	4 (P) ⟷ 6 (E)	Continuity
R position	1 (R) ⟷ 7 (RB)	Continuity
N position	5 (N) ⟷ 6(E)	Continuity
D position	3 (D) ⟷ 6 (E)	Continuity
2 position	2 (2) ⟷ 6 (E)	Continuity
L position	6 (E) ⟷ 8 (L)	Continuity

NG → **REPLACE NEUTRAL START SWITCH ASSEMBLY**

AT

OK

3 INSPECT WIRE HARNESS AND CONNECTOR (NEUTRAL START SWITCH ASSEMBLY - TRANSMISSION CONTROL COMPUTER ASSEMBLY)



HINT:
See page IN-34 for the inspection procedure and precautions for the wire harness and connector.
(a) Connect the neutral start switch assembly connector.
(b) Disconnect connectors B and C of the transmission control computer assembly.
(c) Turn the ignition switch to the ON position.
(d) Using a tester, check the voltage between the terminals from the wire harness side.(For terminal layout, see page AT-17.)
Standard:

Shift Position	Terminal No. (Terminal Symbols)	Voltage [V]
P position	C15 (P) ⟷ B24 (E1)	9-14
Other than P position	C15 (P) ⟷ B24 (E1)	0-1.5
R position	B7 (R) ⟷ B24 (E1)	9-14
Other than R position	B7 (R) ⟷ B24 (E1)	0-1.5
N position	C24 (N) ⟷ B24 (E1)	9-14

Shift Position	Terminal No. (Terminal Symbols)	Voltage [V]
Other than N position	C24 (N) ←→ B24 (E1)	0-1.5
D position	C17 (D) ←→ B24 (E1)	9-14
D position	C17 (D) ←→ B24 (E1)	0-1.5
2 position	C16 (2) ←→ B24 (E1)	9-14
2 position	C16 (2) ←→ B24 (E1)	0-1.5
L position	C25 (L) ←→ B24 (E1)	9-14
L position	C25 (L) ←→ B24 (E1)	0-1.5

NG → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

OK

INSPECT AND REPLACE TRANSMISSION CONTROL COMPUTER ASSEMBLY

DTC	P0710/38	Open or Short in the Fluid Temperature Sensor Circuit

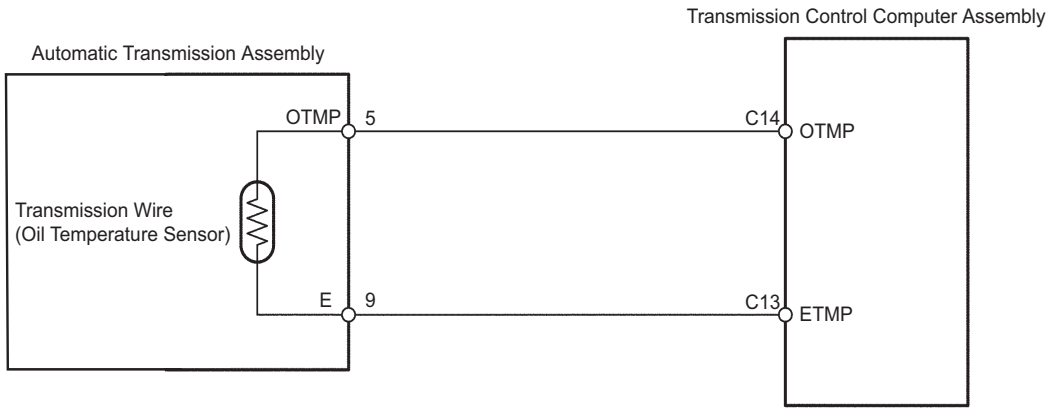
DTC	P0711/38	Fluid temperature sensor performance problem

DESCRIPTION

The fluid temperature sensor attached inside the valve body detects the fluid temperature in the transmission fluid pressure control system circuit, and inputs the signal to the transmission control computer assembly according to the fluid temperature.

DTC No.	1.Diagnosis Condition 2.Error Status 3.Error Period	Suspected Area
P0710/38	1. None 2. The fluid temperature sensor voltage is 0.15 V or less, or 4.90 V or more 3. 0.5 seconds or more	• Wire harness and connector (fluid temperature sensor system) • Transmission sensor (fluid temperature sensor) • Transmission control computer assembly
P0711/38	1. None 2. The fluid temperature sensor voltage is 0.15 V or less, or 4.90 V or more 3. 0.5 seconds or more	• Wire harness and connector (fluid temperature sensor system) • Transmission sensor (fluid temperature sensor) • Transmission control computer assembly

CIRCUIT DIAGRAM



AT

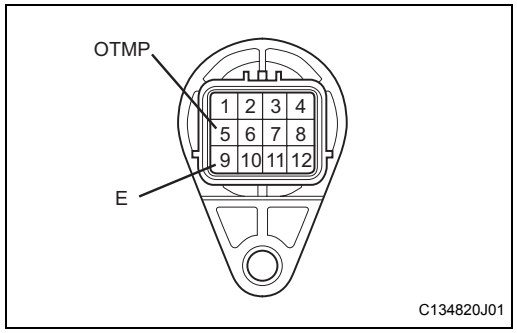
INSPECTION PROCEDURE

HINT:

Read the freeze frame data using the DS-II.Freeze frame data records aspects of the engine's condition when malfunctions occur. This information is helpful when troubleshooting.

1	INSPECT TRANSMISSION WIRE (FLUID TEMPERATURE SENSOR)

SST 09990-97201



(a) Disconnect the transmission wire connector.
(b) Connect SST (A/T solenoid wire check sub-harness).
(c) Using the tester, inspect the resistance between the terminals.
Standard:

Terminal No. (Terminal Symbols)	Fluid temperature [°C]	Resistance [Ω]
5 (OTMP) ⟷ 9 (E)	10	5.63
5 (OTMP) ⟷ 9 (E)	140	0.072

(d) Using the tester, check the insulation between the terminal and body ground.
Standard:

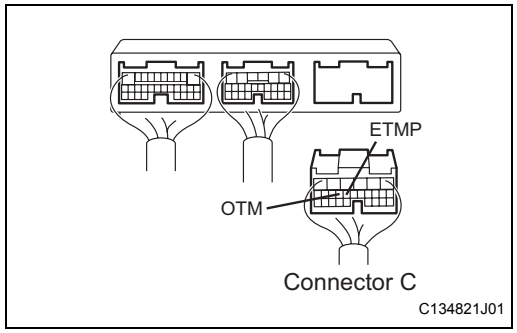
Terminal No. (Terminal Symbols)	Resistance
5 (OTMP) ⟷ Body Ground	1 MΩ or higher

NG → **REPAIR OR REPLACE TRANSMISSION WIRE**

OK

2 **INSPECT WIRE HARNESS AND CONNECTOR (TRANSMISSION WIRE - TRANSMISSION CONTROL COMPUTER ASSEMBLY)**

HINT:
See page IN-34 for the inspection procedure and precautions for the wire harness and connector.



(a) Disconnect the transmission wire connector.
(b) Disconnect connector C of the transmission control computer assembly, and using the tester, inspect the resistance between the terminals.(For terminal layout, see page AT-17.)
Standard:

Terminal No. (Terminal Symbols)	Fluid temperature [°C]	Resistance [Ω]
C14 (OTMP) ⟷ C13 (ETMP)	10	5.63
C14 (OTMP) ⟷ C13 (ETMP)	140	0.072

OK → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

NG

INSPECT AND REPLACE TRANSMISSION CONTROL COMPUTER ASSEMBLY

DTC P0715/37 No Input for Turbine Speed

DESCRIPTION

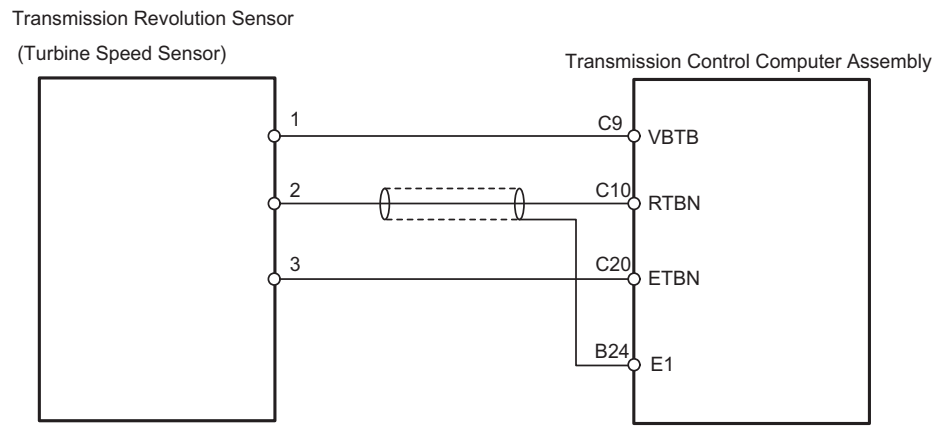
The transmission revolution sensor (turbine speed sensor) inputs input axis speed signals to the transmission control computer assembly.

DTC No.	1.Diagnosis Condition 2.Error Status 3.Error Period	Suspected Area
P0715/37	1. Idling with shift lever in P or N position, or driving in D position 2. Turbine speed signals are not input. 3. 2 seconds	• Wire harness and connector (transmission revolution sensor (turbine speed sensor) system) • Transmission revolution sensor (turbine speed sensor) • Transmission control computer assembly

HINT:

If P0715/37 is output, inspect the neutral start switch assembly first.(See page AT-59)

CIRCUIT DIAGRAM



INSPECTION PROCEDURE

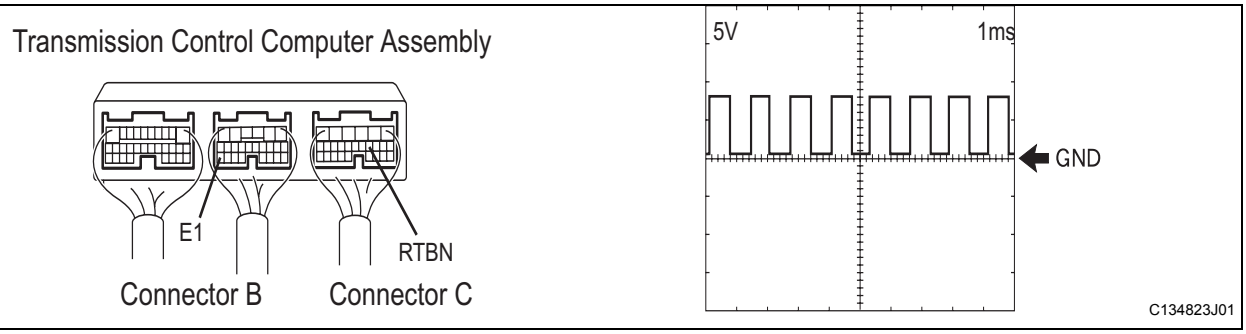
1	INSPECT TRANSMISSION REVOLUTION SENSOR (TURBINE SPEED SENSOR)

(a) Inspect the output waveform.

(b) Connect the DS-II between the C10 (RTBN) and B24 (E1) terminals of the transmission control computer assembly connector.

(c) Set the DS-II to the oscilloscope function.

AT



Item	Condition
Tester Connection	RTBN ⟷ E1
Tool Setting	5 V/DIV, 1 ms/DIV.
Measurement Condition	When idling after warm-up

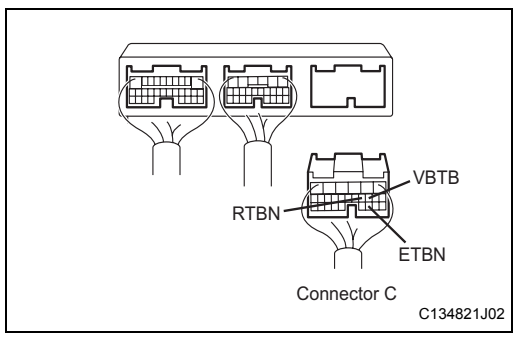
HINT:
As turbine speed increases, the cycle becomes shorter.

NG → **REPLACE TRANSMISSION REVOLUTION SENSOR (TURBINE SPEED SENSOR)**

OK

2 **INSPECT WIRE HARNESS AND CONNECTOR (TRANSMISSION REVOLUTION SENSOR (TURBINE SPEED SENSOR) - TRANSMISSION CONTROL COMPUTER ASSEMBLY)**

AT



HINT:
See page IN-34 for the inspection procedure and precautions for the wire harness and connector.

(a) Disconnect the transmission revolution sensor (turbine speed sensor) connector.

(b) Disconnect connector C of the transmission control computer assembly, and using the tester, inspect the continuity between the terminals.(For terminal layout, see page AT-17.)
Standard:

Terminal No. (Terminal Symbols)	Standard
C20 (ETBN) ⟷ 3 (E2)	Continuity
C10 (RTBN) ⟷ 2 (RTBN)	Continuity
C9 (VBTB) ⟷ 1 (V12)	Continuity

NG → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

OK

INSPECT AND REPLACE TRANSMISSION CONTROL COMPUTER ASSEMBLY

DTC P0720/42 No Input for Output Speed

DESCRIPTION

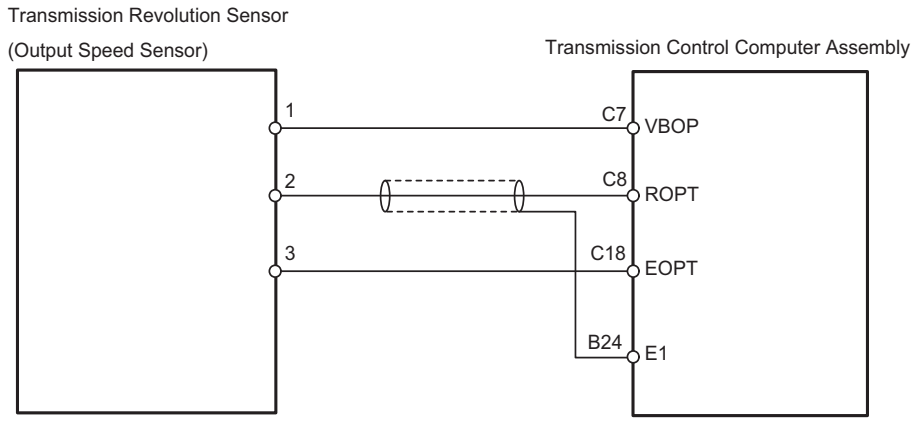
The transmission revolution sensor (output speed sensor) inputs output axis speed signals to the transmission control computer assembly.

DTC No.	1.Diagnosis Condition 2.Error Status 3.Error Period	Suspected Area
P0720/42	1. When driving 2. Output speed signals are not input.Or the ratio to the turbine speed is abnormal. 3. 1 second	• Wire harness and connector (output speed system) • Transmission revolution sensor (output speed sensor) • Transmission control computer assembly

HINT:

If Ço0720/42 is output, inspect the neutral start switch assembly first.(See page AT-59)

CIRCUIT DIAGRAM



C134822J01

AT

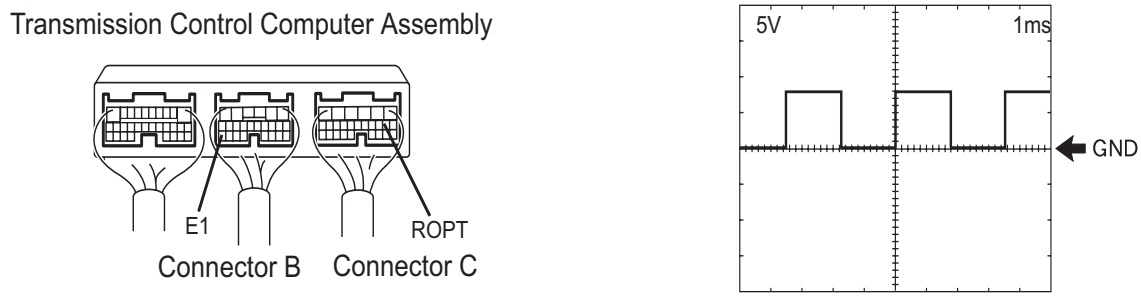
INSPECTION PROCEDURE

1	INSPECT TRANSMISSION REVOLUTION SENSOR (OUTPUT SPEED SENSOR)

(a) Inspect the output waveform.

(b) Connect the DS-II between C8 (ROPT) and B24 (E1) terminals of the transmission control computer assembly connector.

(c) Set the DS-II to the oscilloscope function.



C134824J01

Item	Condition
Tester Connection	ROPT ⟷ E1
Tool Setting	5 V/DIV, 1 ms/DIV.
Measurement Condition	When driving at 20 km/h

HINT:
As output speed increases, the cycle becomes shorter.

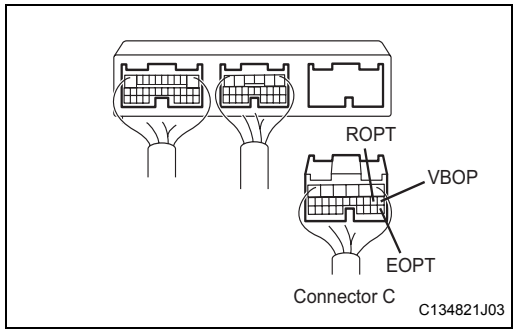
NG → **REPLACE TRANSMISSION REVOLUTION SENSOR (OUTPUT SPEED SENSOR)**

OK

2	INSPECT WIRE HARNESS AND CONNECTOR (TRANSMISSION REVOLUTION SENSOR (OUTPUT SPEED SENSOR) - TRANSMISSION CONTROL COMPUTER ASSEMBLY)

HINT:
See page IN-34 for the inspection procedure and precautions for the wire harness and connector.

(a) Disconnect the turbine speed sensor connector.
(b) Disconnect connector C of the transmission control computer assembly, and using the tester, inspect the continuity between the terminals.(For terminal layout, see page AT-17.)
Standard:



Terminal No. (Terminal Symbols)	Standard
C18 (EOPT) ⟷ 3 (E2)	Continuity
C8 (ROPT) ⟷ 2 (ROPT)	Continuity
C7 (VBOP) ⟷ 1 (V12)	Continuity

OK → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

NG

INSPECT AND REPLACE TRANSMISSION CONTROL COMPUTER ASSEMBLY

AT

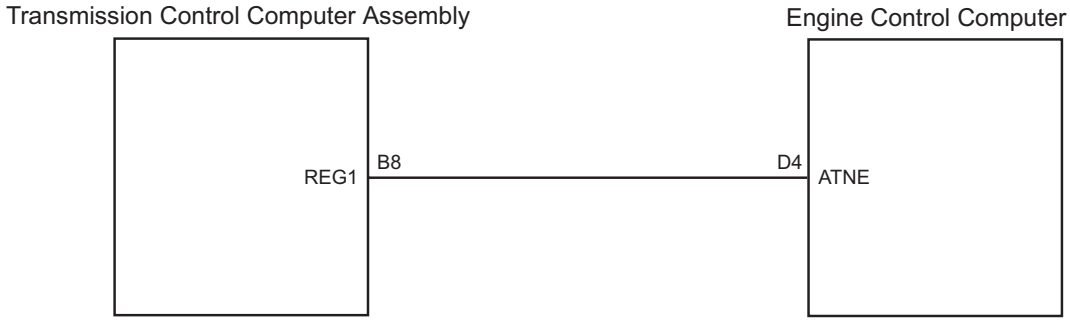
DTC P0725/86 No Input for Engine Speed

DESCRIPTION

This DTC is output when engine speed signals are not input from the engine control computer to the transmission control computer assembly.

DTC No.	1.Diagnosis Condition 2.Error Status 3.Error Period	Suspected Area
P0725/86	1. Engine is running 2. Engine speed signals from the engine control computer are not input to the transmission control computer assembly. 3. 0.5 seconds	• Wire harness and connector (engine control computer - transmission control computer assembly) • Engine control computer

CIRCUIT DIAGRAM



C134825J01

AT

INSPECTION PROCEDURE

HINT:

Read the freeze frame data using the DS-II.Freeze frame data records aspects of the engine's condition when malfunctions occur. This information is helpful when troubleshooting.

1	INSPECT WIRE HARNESS AND CONNECTOR (TRANSMISSION CONTROL COMPUTER ASSEMBLY - ENGINE CONTROL COMPUTER)

HINT:

See page IN-34 for the inspection procedure and precautions for the wire harness and connector.

(a) Disconnect connector B8 (REG1) of the transmission control computer assembly and connector D4 (ATNE) of the engine control computer.

(b) Using a tester, check the continuity between the terminals.(See AT-17 for the transmission control computer assembly terminal layouts, and see page ES-16 for the engine control computer terminal layouts.)

Standard:

Continuity

NG → REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR

OK

INSPECT OR REPLACE ENGINE CONTROL COMPUTER

DTC	P0753/61	Open or Short in the Solenoid No. 1 Circuit

DTC	P0758/62	Open or Short in the Solenoid No. 2 Circuit

DTC	P0763/63	Open or Short in the Solenoid No. 3 Circuit

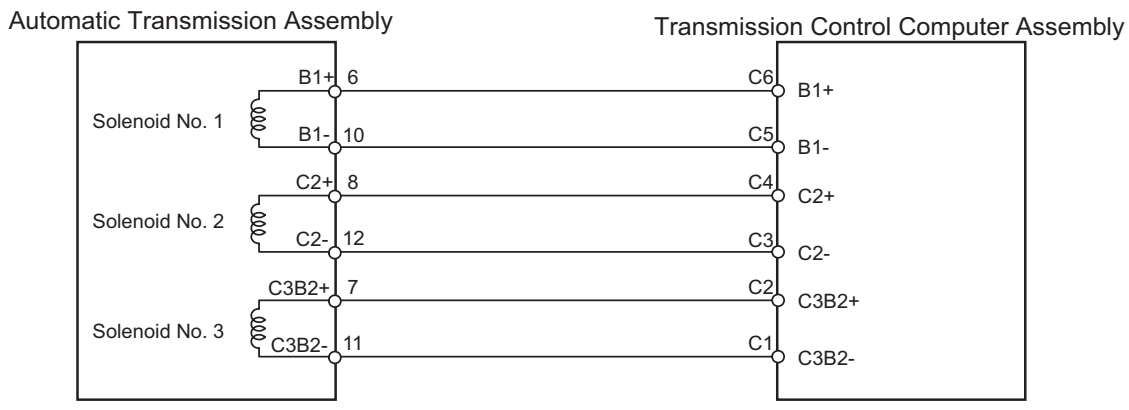
DESCRIPTION

The transmission control computer assembly combines the ON-OFF states of solenoids No. 1, No. 2, and No. 3 to change the drive position from the 1st to 4th.If an open or short circuit occurs in any of the solenoid valve circuits, the transmission control computer assembly turns the other normal solenoid valves ON or OFF as a fail-safe function.In addition, if all of the solenoid valves are disabled, only the mechanical hydraulic circuit is available, enabling manual shifting. (If an open or short circuit occurs, the transmission control computer assembly stops sending current to the failed solenoid valve.)

DTC No.	1. Diagnosis Condition 2. Error Status 3. Error Period	Suspected Area
P0753/61	1. When sending current to solenoid No. 1 2. Open or short in solenoid No. 1 circuit 3. Continues for 0.03 sec. or more	• Wire harness and connector (solenoid No. 1 signal system) • Transmission wire • Solenoid No. 1 • Transmission control computer assembly
P0758/62	1. When sending current to solenoid No. 2 2. Open or short in solenoid No. 2 circuit 3. Continues for 0.03 sec. or more	• Wire harness and connector (solenoid No. 2 signal system) • Transmission wire • Solenoid No. 2 • Transmission control computer assembly
Ço0763/63	1. When sending current to solenoid No. 3 2. Open or short in solenoid No. 3 circuit 3. Continues for 0.03 sec. or more	• Wire harness and connector (solenoid No. 3 signal system) • Transmission wire • Solenoid No. 3 • Transmission control computer assembly

AT

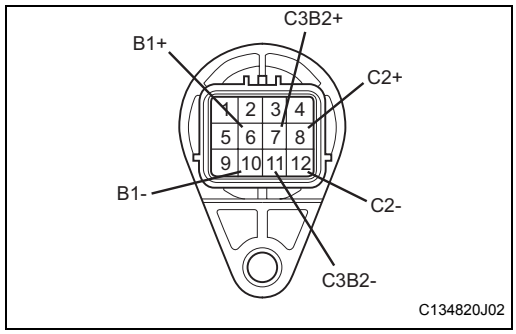
CIRCUIT DIAGRAM



C134826J01

INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (No. 1/No. 2/No. 3)



SST 09990-97201

(a) Disconnect the transmission wire connector.

(b) Connect the SST (A/T solenoid wire check sub-harness).

(c) Using the tester, inspect the resistance between the terminals.

Standard:

Terminal No. (Terminal Symbols)	Resistance [Ω]
6 (B1+) ⟷ 10 (B1-)	5.1 to 5.5 (20°C)
8 (C2+) ⟷ 12 (C2-)	5.1 to 5.5 (20°C)
7 (C3B2+) ⟷ 11 (C3B2-)	5.1 to 5.5 (20°C)

(d) Using the tester, inspect the insulation between each terminal and the body ground.

Standard:

Terminal No. (Terminal Symbols)	Resistance [Ω]
6 (B1+) ⟷ Body ground	1 M or higher
8 (C2+) ⟷ Body ground	1 M or higher
7 (C3B2+) ⟷ Body ground	1 M or higher

Result:

Status	Proceed to
Solenoid No. 1 error	Go to step A
Solenoid No. 2 error	Go to step B
Solenoid No. 3 error	Go to step C
DTC is not output	Go to OK

NG (A) → **GO TO STEP 3**

NG (B) → **GO TO STEP 4**

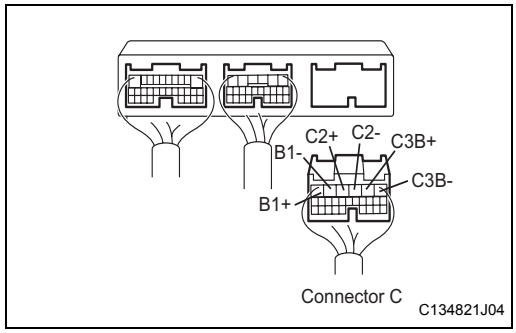
NG (C) → **GO TO STEP 5**

OK

2	INSPECT WIRE HARNESS AND CONNECTOR (TRANSMISSION WIRE - TRANSMISSION CONTROL COMPUTER ASSEMBLY)

HINT:

See page IN-36 for the inspection procedure and precautions for the wire harness and connector.



(a) Connect the transmission wire connector, and disconnect connector C of the transmission control computer assembly.

(b) Using the tester, inspect the resistance between the terminals.(For terminal layout, see page AT-17.)

Standard:

Terminal No. (Terminal Symbols)	Resistance [Ω]
C6 (B1+) ⟷ C5 (B1-)	5.1 to 5.5 (20 C)
C4 (C2+) ⟷ C3 (C2-)	5.1 to 5.5 (20 C)
C2 (C3B2+) ⟷ C1 (C3B2-)	5.1 to 5.5 (20 C)

NG → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

OK

INSPECT AND REPLACE TRANSMISSION CONTROL COMPUTER ASSEMBLY

3 **INSPECT SOLENOID NO. 1**

(a) Disconnect the clutch control solenoid No. 2 (solenoid No. 1) connector.

(b) Using the tester, inspect the resistance between the terminals.

Standard:

5.1 to 5.5 Ω (20°C)

NG → **REPLACE SOLENOID NO. 1**

AT

OK

REPAIR OR REPLACE TRANSMISSION WIRE

4 **INSPECT SOLENOID NO. 2**

(a) Disconnect the clutch control solenoid No. 1 (solenoid No. 2) connector.

(b) Using the tester, inspect the resistance between the terminals.

Standard:

5.1 to 5.5 Ω (20°C)

NG → **REPLACE SOLENOID NO. 2**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

5	INSPECT SOLENOID NO. 3

(a) Disconnect the clutch control solenoid No. 1 (solenoid No. 3) connector.

(b) Using the tester, inspect the resistance between the terminals.

Standard:

5.1 to 5.5 Ω (20°C)

NG → **REPLACE SOLENOID NO. 3**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

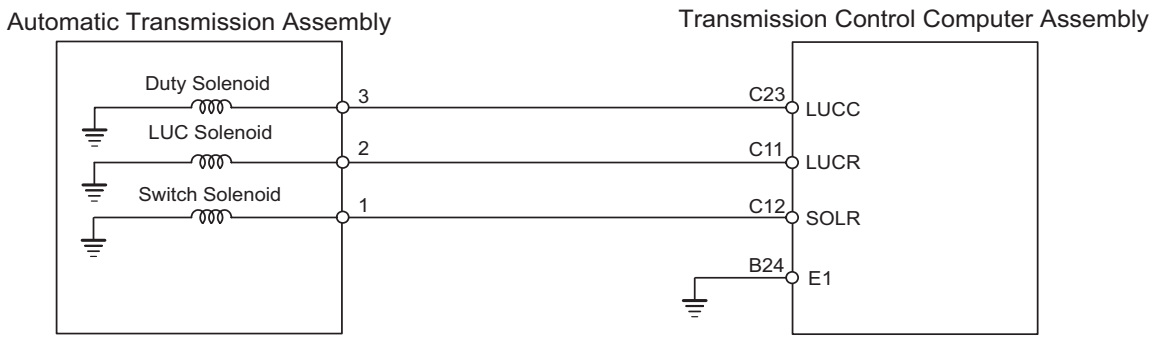
DTC P0768/64 Open or Short in the Duty Solenoid Circuit

DESCRIPTION

The transmission control computer assembly controls the duty solenoid at the predetermined duty ratio.

DTC No.	1. Diagnosis Condition 2. Error Status 3. Error Period	Suspected Area
P0768/64	1. When sending current to the duty solenoid 2. Open or short in solenoid LUCC circuit 3. 0.33 seconds	• Wire harness and connector (LUCC signal system) • Transmission wire (LUCC signal system) • Duty solenoid • Transmission control computer assembly

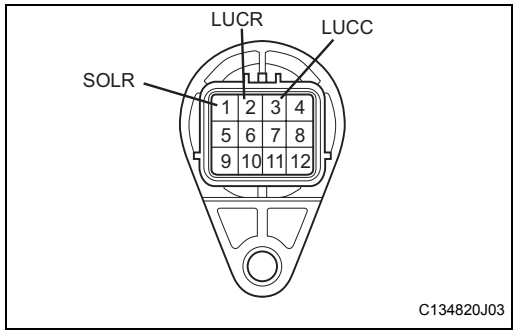
CIRCUIT DIAGRAM



AT

INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (LUCC)



SST 09990-97201

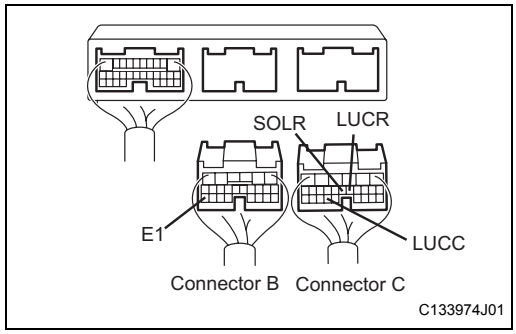
(a) Disconnect the transmission wire connector.
(b) Connect the SST (A/T solenoid wire check sub-harness).
(c) Using the tester, inspect the resistance between the terminals.
Standard:

Terminal No. (Terminal Symbols)	Resistance [Ω]
3 (LUCC) ←→ Body ground	11 to 13 (20°C)

NG → **GO TO STEP 3**

OK

2	INSPECT WIRE HARNESS OR CONNECTOR (TRANSMISSION WIRE - TRANSMISSION CONTROL COMPUTER ASSEMBLY)



HINT:

For inspection procedures and precautions, see page IN-36

(a) Connect the transmission wire connector, and disconnect connectors B and C of the transmission control computer assembly.

(b) Using the tester, inspect the resistance between the terminals.(For terminal layout, see page AT-17.)

Standard:

Terminal No. (Terminal Symbols)	Resistance [Ω]
C23 (LUCC) ←→ B24 (E1)	11 to 13 (20°C)

NG → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

OK

INSPECT AND REPLACE TRANSMISSION CONTROL COMPUTER ASSEMBLY

3	INSPECT DUTY SOLENOID

(a) Disconnect the duty solenoid connector.

(b) Using the tester, inspect the resistance between the solenoid terminal and body.

Standard:

11 to 13 Ω (20°C)

NG → **REPLACE DUTY SOLENOID**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

AT

DTC	P0773/65	Open or Short in the LUC Solenoid Circuit

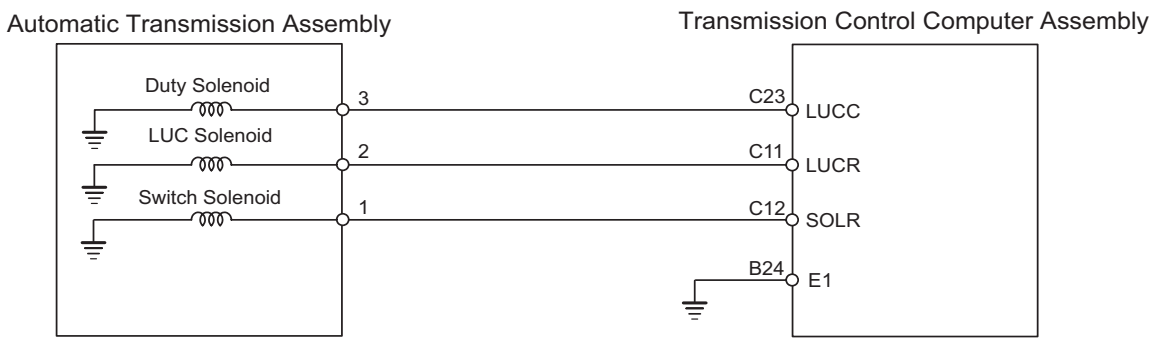
DTC	P1780/66	Switching solenoid circuit disconnection, short circuit

DESCRIPTION

The transmission control computer assembly controls the LUC solenoid at the predetermined duty ratio and performs lock-up.

DTC No.	1. Diagnosis Condition 2. Error Status 3. Error Period	Suspected Area
P0773/65	1. When sending current to the LUC solenoid 2. Open or short in solenoid LUCC circuit 3. 0.04 seconds	• Wire harness and connector (LUCR signal system) • Transmission wire (LUCR signal system) • LUC solenoid • Transmission control computer assembly
P1780/66	1. When sending current to the switch solenoid 2. Open or short in solenoid SOLR circuit 3. 0.04 seconds	• Wire harness and connector (SOLR signal system) • Transmission wire (SOLR signal system) • Switch solenoid • Transmission control computer assembly

CIRCUIT DIAGRAM

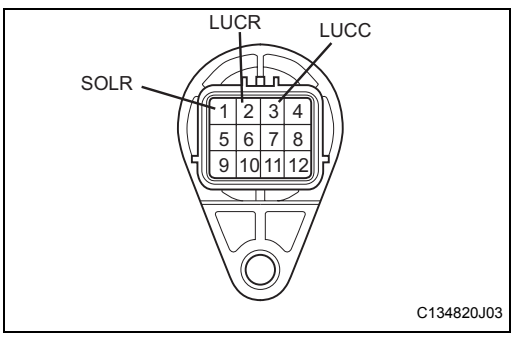


C134827J01

AT

INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (LUCR, SOLR)



C134820J03

SST 09990-97201

(a) Disconnect the transmission wire connector.

(b) Connect the SST (A/T solenoid wire check sub-harness).

(c) Using the tester, inspect the resistance between the terminals.

Standard:

Terminal No. (Terminal Symbols)	Resistance [Ω]
2 (LUCR) ←→ Body ground	14 to 18 (20°C)
1 (SOLR) ←→ Body ground	14 to 18 (20°C)

Result

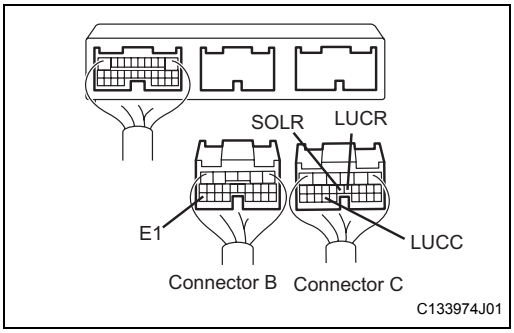
Status	Proceed to
LUC solenoid	Go to step A
Switch solenoid	Go to step B
DTC is not output	Go to OK

NG (A) → **GO TO STEP 3**

NG (B) → **GO TO STEP 4**

OK

2 **INSPECT WIRE HARNESS OR CONNECTOR (TRANSMISSION WIRE - TRANSMISSION CONTROL COMPUTER ASSEMBLY)**



HINT:

For inspection procedures and precautions, see page IN-36

(a) Connect the transmission wire connector, and disconnect connectors B and C of the transmission control computer assembly.

(b) Using the tester, inspect the resistance between the terminals.(For terminal layout, see page AT-17.)

Standard:

Terminal No. (Terminal Symbols)	Resistance [Ω]
C11 (LUCR) ←→ B24 (E1)	14 to 18 (20°C)
C12 (SOLR) ←→ B24 (E1)	14 to 18 (20°C)

NG → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

AT

OK

INSPECT AND REPLACE TRANSMISSION CONTROL COMPUTER ASSEMBLY

3 **INSPECT LUC SOLENOID**

(a) Disconnect the LUC solenoid connector.

(b) Using the tester, inspect the resistance between the solenoid terminal and body.

Standard:

14 to 18 Ω (20°C)

NG → **REPLACE LUC SOLENOID**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

4 **INSPECT SWITCH SOLENOID**

(a) Disconnect the switch solenoid connector.

(b) Using the tester, inspect the resistance between the solenoid terminal and body.

Standard:

14 to 18 Ω (20°C)

NG → **REPLACE SWITCH SOLENOID**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

DTC P1703/72 Lock-up Speed does not Match

DESCRIPTION

This DTC is output when the engine speed and lock-up speed differ significantly during the direct lock-up.

DTC No.	DTC Detection Condition 1.Diagnosis Condition 2.Error Status 3.Error Period	Suspected Area
P1703/72	1. During the direct lock-up 2. The engine speed and lock-up speed differ significantly. 3. 2 seconds	• Valve body assembly • Torque converter assembly • Transmission assembly

INSPECTION PROCEDURE

1 CHECK FLUID PRESSURE

(a) Lift up the vehicle.
(b) Start the engine.
(c) Gradually depress the accelerator pedal to shift to the 3rd gear, and keep accelerating. Measure the LUC ON pressure and LUC OFF pressure during the direct lock-up.
Standard:
617 - 715 kPa (6.5 - 7.3 kgf/cm) (LUC ON pressure - LUC OFF pressure)
HINT:
To measure the fluid temperature again after the warning is displayed, stop the vehicle, shift to the N position (release the fail), and shift to the D position again. Then start the measurements.

NG → **REPLACE VALVE BODY ASSEMBLY**

OK

2 INSPECT TORQUE CONVERTER

HINT:
See page IN-36 for the inspection procedure of the torque converter assembly.

NG → **REPLACE TORQUE CONVERTER**

OK

REPAIR OR REPLACE AUTOMATIC TRANSMISSION ASSEMBLY

AT

DTC P1706/31 Engine Torque Error

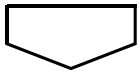
DESCRIPTION

DTC No.	Detection Item	Trouble Area
P1706/31	Engine system error	Engine system

INSPECTION PROCEDURE

1	INSPECT ENGINE CONTROL SYSTEM

(a) Check for DTCs of the engine system using the DS-II.(See page ES-8 for procedures) (See page ES-3 for the DTC chart)



GO TO DIAGNOSTIC TROUBLE CODE CHART

DTC P1711/41 Throttle sensor signal error

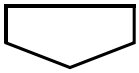
DESCRIPTION

DTC No.	Detection Item	Trouble Area
P1711/41	Throttle sensor system errors	Throttle sensor system

INSPECTION PROCEDURE

1	INSPECT ENGINE CONTROL SYSTEM

(a) Inspect the throttle sensor system.(See page ES-38)



GO TO THROTTLE SENSOR SYSTEM

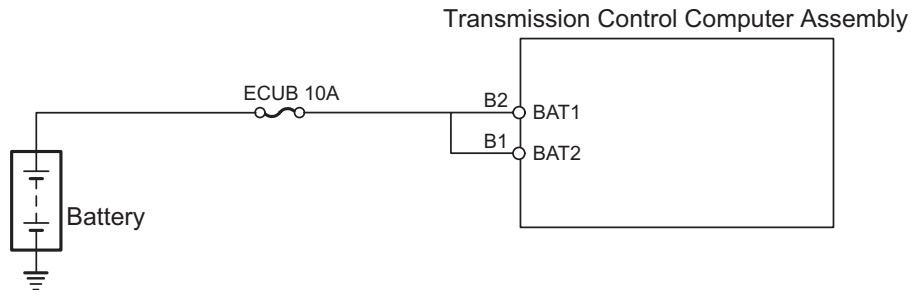
DTC P1730/21 Battery System Power Source Error

DESCRIPTION

This DTC is output when the battery system power source (BAT1, BAT2) is abnormally cut off for a certain period of time.

DTC No.	DTC Detection Condition 1.Diagnosis Condition 2.Error Status 3.Error Period	Suspected Area
P1730/21	1. Always 2. Battery system power source (BAT1, BAT2) is cut off. 3. 0.1 seconds	Wire harness or connector (battery power source system)

CIRCUIT DIAGRAM

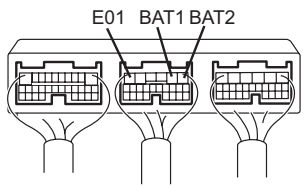


C135132J01

AT

INSPECTION PROCEDURE

1 **INSPECT TRANSMISSION CONTROL COMPUTER ASSEMBLY (VOLTAGE INSPECTION)**



C134828J02

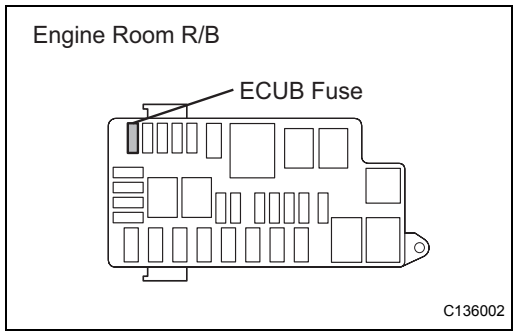
(a) Measure the voltage between the terminals of the transmission control computer connector using the tester.

Terminal (Terminal Name)	Standard
B2 (BAT1) - B6 (E01)	10 to 14 V
B1 (BAT2) - B6 (E01)	10 to 14 V

OK → **HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS**

NG

2	INSPECT FUSE (ECUB)

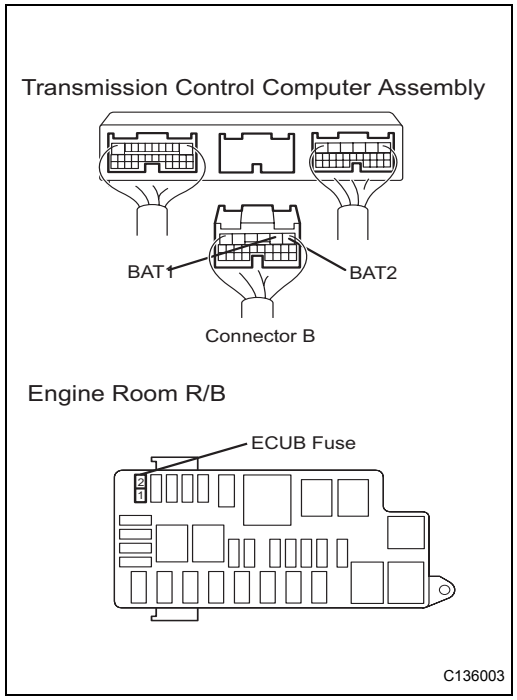


(a) Remove the ECUB fuse from the engine room R/B.
(b) Using a tester, check for continuity.
Standard:
Continuity

NG → **REPLACE FUSES**

OK

3	INSPECT WIRE HARNESS OR CONNECTOR (TRANSMISSION CONTROL COMPUTER ASSEMBLY - ECUB FUSE)



HINT:
See page IN-36 for the inspection procedure and precautions for the wire harness and connector.

(a) Disconnect connector B of the transmission control computer assembly.
(b) Remove the ECUB fuse from the engine room R/B.
(c) Using the tester, check for continuity and short between the vehicle side connector of the transmission control computer assembly and the ECUB fuse holder.(For terminal layout, see page AT-17.)

AT

Standard:

Terminal (Terminal Name) Transmission control computer assembly ←→ ECUB fuse holder	Standard
B2 (BAT1) ←→ 2	There is continuity and no short between the other terminals or body ground.
B1 (BAT2) ←→ 2	There is continuity and no short between the other terminals or body ground.

NOTICE:
When taking the measurement using the tester probe, do not press the tester probes too hard as it may cause damage to the holder part.

NG → REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR

OK

CHECK FOR INTERMITTENT PROBLEMS

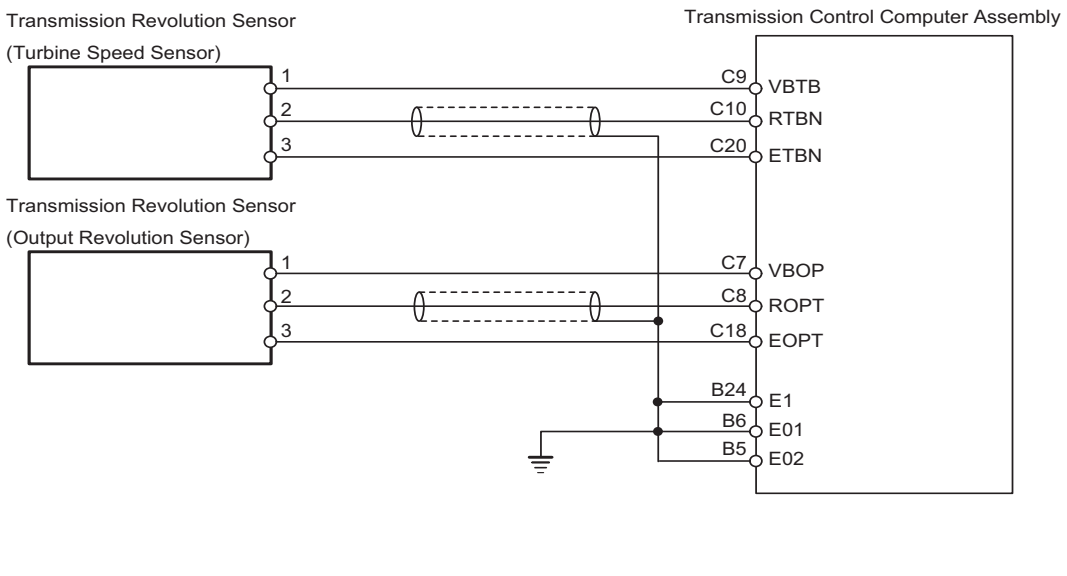
DTC P1731/22 Sensor System Power Source Error

DESCRIPTION

This DTC is output when there is no input from the speed sensor systems for a certain period of time.

DTC No.	1.Diagnosis Condition 2.Error Status 3.Error Period	Suspected Area
P1731/22	1. Always 2. No input from the turbine speed sensor and output speed sensor 3. 0.1 seconds	• CHECK WIRE HARNESS OR CONNECTOR (SPEED SENSOR POWER SOURCE SYSTEM) • Transmission revolution sensor (turbine speed sensor) • Transmission revolution sensor (output speed sensor)

CIRCUIT DIAGRAM

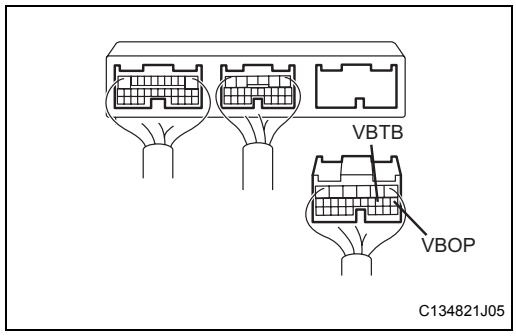


C135133J01

AT

INSPECTION PROCEDURE

1	INSPECT WIRE HARNESS OR CONNECTOR (TRANSMISSION CONTROL COMPUTER ASSEMBLY - BODY GROUND)



HINT:

See page IN-36 for the inspection procedure and precautions for the wire harness and connector.

(a) Disconnect connector C of the transmission control computer assembly.

(b) Using the tester, check the continuity between the terminals.(For terminal layout, see page AT-17.)

Standard:

Terminal No. (measurement terminal)	Standard
C9 (VBTB) ←→ Body ground	Continuity
C7 (VBOP) ←→ Body ground	Continuity

NG → **REPAIR OR REPLACE WIRE HARNESS OR CONNECTOR**

OK

2	INSPECT TRANSMISSION REVOLUTION SENSOR (TURBINE SPEED SENSOR)

(a) Connect the DS-II to the DLC.

(b) Turn the ignition switch to the ON position, and follow the prompts on the DS-II screen to check for DTCs.(See page AT-13)

(c) When disconnecting the vehicle side connector of the transmission revolution sensor (turbine speed sensor), check that P1731/22 will be cleared.

Standard:

DTC P1731/22 is cleared.

HINT:

When disconnecting the vehicle side connector of the transmission revolution sensor (turbine speed sensor), take notice that P0715/37 will be displayed.

OK → **REPLACE TRANSMISSION REVOLUTION SENSOR (TURBINE SPEED SENSOR)**

NG

3	INSPECT TRANSMISSION REVOLUTION SENSOR (OUTPUT SPEED SENSOR)

(a) Connect the DS-II to the DLC.

(b) Turn the ignition switch to the ON position, and follow the prompts on the DS-II screen to check for DTCs.(See page AT-13)

(c) When disconnecting the vehicle side connector of the transmission revolution sensor (output speed sensor), check that P1731/22 will be cleared.

Standard:

DTC P1731/22 is cleared.

AT

HINT:
When disconnecting the vehicle side connector of the transmission revolution sensor (output speed sensor), take notice that P0720/42 will be displayed.

NG → **HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS**

OK

REPLACE TRANSMISSION REVOLUTION SENSOR (OUTPUT SPEED SENSOR)

DTC	U0100/82	EFI Communication Receiving Error

DTC	U0101/85	EFI Communication Sending Error

DESCRIPTION

DTC No.	Detection Item	Trouble Area
U0100/82	Cannot receive communication signals from the engine control computer.	CAN communication
U0101/85	Cannot send communication signals from the engine control computer.	CAN communication

INSPECTION PROCEDURE

1	READ DTCS

(a) Record the DTCs.

HINT:

If a CAN communication error DTC and corresponding sensor error DTC are output at the same time, troubleshoot the sensor error codes after the communication returns to normal.

GO TO TROUBLESHOOTING FOR CAN COMMUNICATION SYSTEM

AT